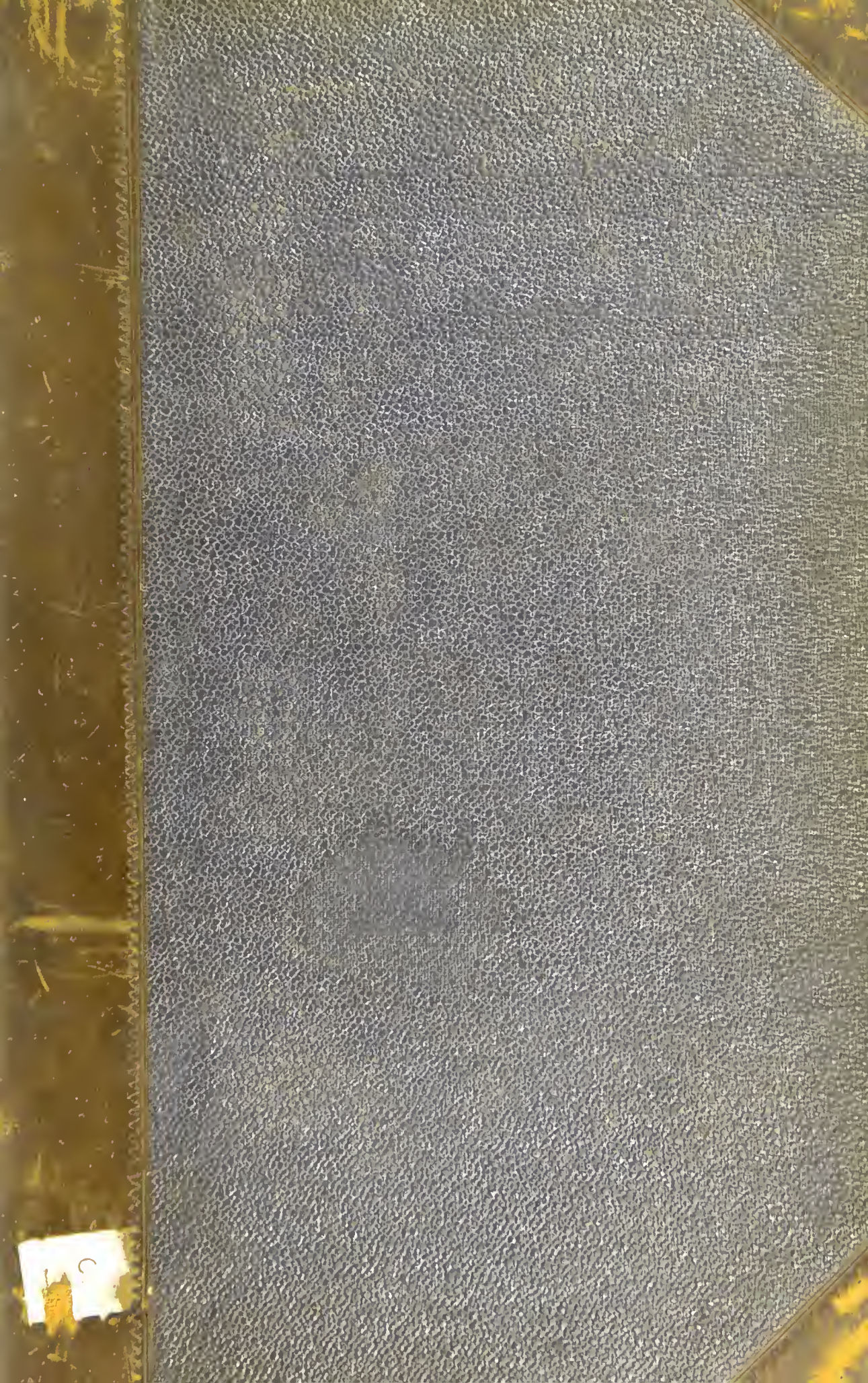






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Written for the System of Surgery
published November 1864
B. J.

DISEASES OF THE URINARY ORGANS.

UNDER the term *urinary organs* will be here comprised the kidneys, ureter, bladder, prostate, and urethra.

It is extremely desirable, when dealing with any disease the symptoms of which are referred chiefly or entirely to some limited portion of the important system defined above as urinary organs, to possess an intelligent acquaintance, not merely with any part which may be especially liable to suffer morbid changes, but with the system itself as a whole. It is absolutely necessary to the formation of a correct diagnosis, to be familiar with the intimate relations which exist between each portion of that system, as well as with the various peculiarities which each is prone to exhibit when influenced by disease. Few things conduce more to error in estimating symptoms than a too exclusive specialism in the observation of disease. The study of stricture and of other forms of urethral obstruction, of vesical diseases, of calculous formations, and of those chronic changes in the secreting structure of the kidney which are conventionally assigned to the province of the physician, must be pursued together if the Surgeon is properly to appreciate the import of any one of these affections. For example, suppose a Surgeon about to perform an important operation upon the bladder or urethra (and what operation there is not important?), who is unacquainted with, or is at least indifferent to, the chemical and microscopical characters of his patient's urine, will any one, who is himself acquainted with those indications of the condition of the kidneys which these characters reveal, deny that elements most important to the formation of a correct diagnosis, and, therefore, to an appropriate therapeutical scheme, must be absent from the mind of the Surgeon in relation to that case? It may be replied, that the necessary information can be obtained from the physician. Ought the Surgeon to be dependent for an acquaintance with the facts required upon any other observer in such a case? Assuredly not: not only is the knowledge easy to attain, and convenient to possess, but it may be safely held that the Surgeon who views with equal intelligence the lesions, both functional and organic, which affect the kidneys, the bladder, and the urethra, will be, *ceteris paribus*, the safest and most successful ad-

viser in the ailments of any one of those viscera. The relations which mutually subsist between each of the series, not only by contiguity, but by other and less obvious connexions, are so numerous and constant, that a study of the whole can alone qualify the practitioner intelligently to treat disordered function in any part thereof. I do not hesitate to affirm, that no man can deal adequately and safely with cases of impaired urinary function, whose hand is not well trained to the use of the sound or catheter, whose eye is not familiar with urinary deposits in all their varieties of crystals, corpuscles, and renal casts, and who is not acquainted with their indications so far as these are known, as well as with the significance of those subjective phenomena which are found accompanying them. The exploring sound is quite as essential to the diagnosis of urinary disease as the stethoscope is to affections of the chest. He who is a physician only, will (and does) constantly overlook calculus and stricture, to the great detriment of the patient; while the mere surgical handiworkman will (and does) treat mechanically many a case which can only be injured by his manipulations. With these views, the careful study of all acute and chronic renal affections is recommended to the student who desires to qualify himself specially for the practice of surgery.

The following is a table of those renal affections which necessarily come under the observation of the Surgeon, in connexion with the diseases of the bladder, prostate, and urethra, which so frequently demand his services. The limit assigned to the department of urinary disease in this work forbids more than the slightest glance at them; it appears, therefore, the more necessary to make these introductory remarks.

THE KIDNEYS :

Malformations.

Injuries (vol. ii. p. 421).

<i>Inflammation</i> (nephritis),	{ traumatic, idiopathic, and by extension.
" <i>acute</i> ,	{ calculous.
	{ from obstruction in the passage below.
" <i>chronic</i> ,	{ calculous.
	{ from obstruction.
" <i>of pelvis of kidney</i> (pyelitis).	{ diathetic.
" <i>acute and chronic</i> ,	{ from obstruction.
	{ calculous.
	{ serofulous.

Calculous nephralgia.

Abscess of kidney and fistula.

Perinephritic abscess.

Tumours of kidney.

Suppression of urine.

Hæmaturia.

For the
Page
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Malformation. There are few deviations from the normal conditions which can be regarded as malformations, and these are unimportant to the Surgeon. It is only necessary therefore to enumerate the ordinary varieties. (1) There may be only one kidney, which is then usually larger than natural; it may lie in its usual place, or may in reality consist of the two organs joined in the median line, and occupy a position in front of the vertebral column. In the last-named condition the form is sometimes that of a horse-shoe with its convexity downwards. (2) One kidney may occupy its ordinary situation, and a second may be movable, forming a tumour recognisable during life; or it may be fixed in an unusual situation, generally lower than natural, or within the pelvis. (3) The kidney may present an outline more or less lobulated, showing the persistence of a form existing in foetal life, and natural in some of the lower animals. (*See also malformations of the bladder p.*

Nephritis. Acute and chronic.

Acute nephritis, of a severe form, is common in surgical practice. It exists also as a sequel to preëxisting chronic inflammation of the kidney, and in Bright's disease.

The causes of the first-named variety, with which almost exclusively we have to deal here, are as follows:

Wounds, bruises, and strains; by extension from the bladder in cases of calculus, stricture, and cystitis, following operations or otherwise; retention of urine, causing distension of the ureter and fluid pressure on the kidney; renal calculus; entozoa; extension of inflammation from neighbouring parts, as diseased vertebræ, &c.; diuretics in over-doses; cantharides and turpentine; exposure to cold; and alcoholic drinks. It will be observed that many of these causes act almost exclusively on the male, and in connexion with surgical affections. In the female, nephritis is more commonly associated with uterine diseases.

Symptoms. The first is usually an attack of rigors; nausea, often vomiting, prone to be obstinate, generally soon succeed. Pains in the back and loins, dull and heavy, sometimes lancinating, increased by the upright position, by coughing and vomiting, even by respiration, and often extending along the ureter. Occasionally there are aching or numbness in the thigh of side affected, and tenderness on pressure in the renal region, sometimes considerable. Micturition is frequent; the urine is mostly high coloured and scanty; neutral or alkaline; often mingled with blood, and then becoming albuminous, not otherwise; later in the disease it may

be purulent. Under the microscope renal casts may be found containing pus and blood-corpuseles. Sometimes total suppression occurs. General signs of fever are present, as heat of skin, dry furred tongue, headache, thirst, quick and hard pulse. Anasæra often appears also, in cases suddenly occurring from exposure to cold; not commonly in cases of extension from the bladder.

In the latter instances, suppuration in the substance of the kidney is to be dreaded; the symptoms are then more intense, there is great depression of the vital powers, and fatal coma often occurs by uræmic poisoning. If pyelitis accompanies or supervenes on nephritis, there is also generally pain and retraction of the testicle on the affected side.

As it is impossible to include in this work a history of all the renal and allied affections with which the Surgeon should be familiar, a few remarks will follow here on the differential diagnosis of nephritis, so as to illustrate the leading characters of those other diseases which might be confounded with it.

The *diagnosis* is not generally difficult, although in a few instances it may be obscure. If a patient, who has suffered long from urethral or vesical disease, or who has recently undergone an operation for stone or stricture, suddenly shows signs of an acute febrile invasion, with vomiting, pain and tenderness in the renal region, scanty urine, or urine mixed with blood, there can be little doubt of the presence of acute nephritis. When there is no history of previous urinary complaints, an attack of primary acute nephritis may sometimes be confounded with the following affections: calculous nephralgia; pyelitis, simple and calculous; perinephritis; perinephritic abscess; spinal disease, or abscess of the psoas or adjacent parts; lumbago; renal neuralgia and hysteria; inflammation of the bladder; vesical calculus.

1. *Calculous nephralgia*; by which is intended the pain and systemic disturbance occasioned by the descent of a calculus from the kidney to the bladder, and which sometimes resembles very closely acute nephritis. Indeed, excepting only the severe febrile symptoms, all those of nephritis are present. There is acute pain, generally limited to one side, and shooting along the loins to the sacrum, with retracted testicle; but the invasion is more sudden, and the pain more acute, than in nephritis. There may be vomiting, frequent micturition, and bloody urine; but the constitutional disturbance, although it may sometimes be present in moderate degree, certainly falls short of the fever which always accompanies the inflammatory affection. If the calculus obstructs the pelvis or

ureter for any length of time, symptoms of calculous pyelitis may arise. And lastly, all the phenomena may suddenly disappear, which confirms the diagnosis of calculus.

2. *Acute calculous pyelitis* may be distinguished by the following characters: the pain in the back is excessively severe and lancinating, much more so than in nephritis; shooting pains are felt in the groin and inner part of the thigh, radiating to the testicle, which is generally strongly retracted. When the pyelitis is unaccompanied by renal affection, the urine is often acid; and although it may be scanty at first, is subsequently voided in natural quantity. It may have much pus and epithelium mixed with it, and sometimes blood; if so, these matters are found in intimate admixture with the urine. The course of the complaint is less rapid than that of nephritis, and there are frequently considerable intervals of freedom from pain.

3. *Perinephritis; caries of spine*. Inflammation of the tissue surrounding the kidney does not generally make its appearance with an acute attack. The subsequent formation of matter, if it takes place, is accompanied by febrile symptoms; but the gradually increasing swelling, in its later stages presenting fluctuation, while at the same time the urine is healthy, is significant of simple perinephritic abscess, provided the special signs of spinal disease are absent. If, on the contrary, there has been marked tenderness on pressure or percussion at one spot over the vertebral column, and, *à fortiori*, if there exists angular curvature, if there has been any interference with the functions either of sensation or of motion, the spine is obviously the seat of disease. When abscess of the psoas exists independently of the signs of spinal disease, there will generally be noted some disturbance in the nerve-function of the corresponding thigh; and at the same time the motions of the hip-joint will be impaired by the inability to act, from the loss of power in the psoas muscle. Pain on pressure also is more marked in front than behind, the reverse occurring in perinephritis, and sometimes in nephritis.

4. *Rheumatic affection* of the dorsal muscles, or lumbago, is usually productive of great pain, on any effort being made which necessitates the slightest movement of these muscles, much more so than in nephritis; pains also often exist elsewhere, but vomiting and other constitutional signs are absent. Again, the urine is neither suppressed nor materially altered in character; it may be more than usually acid, but it is not alkaline.

5. *Renal neuralgia* is met with, but chiefly in women. Very severe pains are complained of by individuals of nervous and lym-

terical temperaments, which it does not require very acute observation to separate from nephritis. The condition of the urine, mostly pale and abundant, the absence of constitutional symptoms, and the existence of mental excitement, will be sufficient to mark these cases.

6. *Acute cystitis* is sometimes attended with phenomena which seem to indicate that the kidney is the seat of disease. There may be present great pain in the renal regions, and febrile symptoms of severe character; but also in the pubic and perineal regions; and there are supra-pubic tenderness and suffering in passing water, while the urine, which is usually acid, exhibits abundance of small flakes of exudation-matter floating throughout, and is clouded, yet has only traces of albumen and no blood mixed with it. It may contain pus, and be alkaline; but this is generally as the acute subsides into the chronic form of disease. In later stages of severe cystitis the urine becomes bloody.

7. *Calculus of the bladder* is sometimes attended with an aggravation of symptoms which may be mistaken for acute nephritis. All the local and much of the constitutional disturbance of the latter complaint may be produced, as their rapid subsidence seems to indicate, from mere temporary irritation of the kidney, occasioned by the presence of calculus in the bladder. An examination of the previous history and symptoms, of the urine itself, and the speedy relief which follows simple remedial means, will indicate the real cause, respecting which the sound subsequently employed at the proper time will enable us to clear up any doubts which may still exist.

Treatment of acute nephritis. It is of importance at the outset to insure free action of the liver and bowels, which are often very obstinate. In addition to active purgatives, enemata are recommended; but distension of the colon with irritating fluids is undesirable, and emollient injections alone are admissible; thus, turpentine should be avoided, lest absorption should irritate the kidney. Perfect rest in bed, and low diet, are to be enjoined. Local bleeding by leeches or by cupping is very serviceable: by the latter mode ten or twelve ounces may be taken, and the bleeding may be repeated with advantage if the patient is hale and the attack severe; otherwise, it should be followed by dry cupping, daily or on alternate days. The utility of antimony and salines (generally more or less diuretic) is questionable, and the repeated administration of diuretics is contraindicated; the moderate use of simple diluents, water, linseed-tea, barley-water, or milk-and-water, is preferable. Free action of the skin should be promoted by hot baths or large hot fomentations. For the vomiting, when obstinate and distressing, hydrocyanic acid and kresote fail, though sometimes successful in mild cases; but counter-irritation to the loins and pit of stomach affords better results; a constant supply of ice in the mouth also helps to allay it. When head-symptoms appear, the most efficient remedies are purgation and renewed counter-irritation over the renal region; similar applications should be made to the temples and to the nape of the neck, with hot bottles and sinapisms to the feet and legs. In apply-

ing counter-irritation, cantharides should not be employed, on account of its known irritant action on the kidney, in some cases even by endermic application; the desired result may be attained equally well by chloroform, ammonia, mustard, or more slowly by nitrate of silver. If either of the two former are selected, dilute with equal parts of spirit; soak a piece of lint the size desired and lay on the surface, covering instantly with oiled silk, and making gentle pressure; in a few minutes the full effect will be seen. In later stages of the complaint, internal stimuli and support may be necessary.

Where acute nephritis first shows itself, as is often the case in surgical practice, by extension from the urethra or bladder in a debilitated subject, the general principles enumerated above must guide the treatment, but actual depletion is rarely permissible. All unnecessary irritation of the urinary apparatus must be avoided, and no catheters passed, if they have been necessary before, unless absolutely demanded by the exigencies of the case, and then with the utmost care and gentleness. If following lithotrity, all mechanical interference must be suspended, and catheterism used only to relieve an obvious retention. If suppuration take place in the kidney, or the urine be suppressed, little can be hoped for from treatment; active counter-irritation of the renal region and internal stimuli must be perseveringly employed while any hope exists.

Treatment of the attack of calculous nephralgia. The hot bath; antispasmodics and opium liberally administered; cupping to the renal region, and hot cataplasms afterwards; mild diuretics, particularly the decoction of the couch grass or *triticum repens*; abundance of diluent drinks. Sometimes the occasional inhalation of chloroform, to relax the muscles for a period of ten to twenty minutes, has been of service.

Treatment of chronic pyelitis. If occurring from obstruction in the urethra, the most efficient treatment consists in overcoming it, and enabling the urine to pass freely, so as to relieve the dilated and diseased pelvis of the kidney from distension and pressure. At the same time, the purulent discharge is sometimes diminished by full doses of buchu, and small doses of cubebs and the balsams; sometimes by mineral acids. Abundant nutriment is generally necessary. If the complaint depends on calculus in the kidney, and an examination of the urine or the history has indicated pretty clearly the nature of the formation, appropriate remedies can be taken with the view of dissolving it or at least of hindering its increase. Such are alkaline salts, as the citrate of potash in uric acid calculi, and acids mineral or benzoic for those which are phosphatic. All sources of local irritation must as much as possible be avoided, as sudden or violent movements of the body, and irregular habits of all kinds. Wherever the signs of general malassimilation are present, especially those of the tuberculous diathesis, the appropriate constitutional treatment must be enjoined. Scrofulous pyelitis is, however, rare.

Abscesses may be formed under these circumstances; also as the sequel of nephritis; they should not be opened until the tumour points and the diagnosis is perfectly clear. Often they are perinephritic, although originated by disease within the kidney itself; occasionally a calculus may be removed through the opening made. If not opened sufficiently early, these abscesses may make their way internally, or along the sheaths of muscles, and open in the groin or elsewhere. They may heal soundly, or give rise to renal fistula.

It is necessary to bear in mind that other tumours in the renal region may be confounded with abscess, such as cystic disease of the kidney; simple fluid distension of the pelvis; accumulation of blood in the same situation; encephaloid and tubercular deposits, and

hydatid eysts adjacent to the kidney; besides abscesses, which are the effects of spinal caries. Among these, ordinary cystic disease affords no very obvious signs: the character of the urine may be unaffected; if the eyst is large, dulness on percussion is present. Distension of the pelvis with fluid may be due to retained urine, or merely serous fluid, and may in very rare cases afford the sense of fluctuation externally. If there is a partial communication with the ureter, the amount of water passed will differ greatly on different days. Cancer of the kidney is encephaloid in six cases out of seven; the pain is severe, the growth rapid, the tumour extremely large and abdominal; hæmaturia is present, and the diathesis is generally marked. Tubercle in the kidney rarely produces a tumour appreciable during life, and its symptoms point much more to the bladder than to the organ affected; tubercle in the lungs, and elsewhere, usually coexist. Tumours containing blood are almost invariably recognised as originating from direct violence, or from a strain in violent exercise. Tumours containing accephalocysts are very rare; they are usually in connexion with the pelvis of the kidney, and may exist for a very long period without rupture, subsequent to which hooklets, &c. are found in the urine. In rare instances, both these and the tumour produced by great distension of the pelvis of the kidney have been successfully punctured.

Chronic nephritis is not always a well-marked disease, except as a sequel of the acute attack, not including under the term that constitutional state of which the most marked sign is the admixture of albumen in the urine, and which is ordinarily known as Bright's disease. Here the kidney is, strictly speaking, perhaps secondarily affected; but the fact of its degeneration may be always noted in advanced stages. It is of the utmost importance that the Surgeon should be familiar with its phenomena, as, in dealing with diseases affecting the bladder or urethra, the presence of Bright's disease is a circumstance of grave import, which may greatly influence the treatment required by the other affection; nevertheless, its purely medical character as a blood disease must exclude its consideration here.

The remedial means for simple chronic nephritis consist in local stimulating applications to the renal region, avoiding specific renal irritants, before specified, combined with the constitutional treatment of chronic inflammation.

Renal calculi. (See the essay on CALCULUS.)

Hæmaturia signifies simply the presence in the urine of blood; which may exist in any quantity, from an amount discoverable only by the microscope, up to that in which it constitutes the major pro-

portion of the fluid passed by the urethra. It is a symptom, merely, of disease in some part of the urinary organs. When blood is present in small proportion, and has been in contact with the urine for a considerable time, the latter presents a peculiar brownish colour, characteristic to the practised eye, and commonly known as the "smoky tint." If in large quantity, under similar circumstances, the mixture has the appearance of thick or muddy coffee. The source of the blood in hæmaturia may be any one or more of the following parts: the kidney, the pelvis of the kidney, the ureter, bladder, prostate, or urethra.

Hæmaturia occurs in acute and chronic diseases of the kidney; from injury, as by blows, strains, &c.; from calculus in any part of the urinary tract; from violent diuretics, as turpentine or cantharides; in cystitis sometimes; in prostatic disease; in malignant disease of any part of the urinary organs; in villous tumours of the bladder; in the hæmorrhagic diathesis; and in certain states of the blood, as in fever, purpura, and allied conditions; in stricture of the urethra; from chordee; from the local application of mechanical and chemical agents.

It is always important to determine its source; the following hints will assist in forming a correct diagnosis:

Renal hæmorrhage, not being traumatic, is usually preceded or accompanied by some signs of kidney-disease; which is most frequently acute desquamative nephritis, and renal casts are usually found in the urinary deposit; the blood is always intimately mixed with the urine, which shows the smoky tint. Further, it may be said, as a general rule, that such urine passed without pain, or any other local symptom whatever, is more likely to derive its blood from the kidney than elsewhere. Hæmaturia from a calculus impacted in the pelvis or ureter is associated with the history and signs of the occurrence (see Calculous Nephralgia). Hæmaturia caused by a blow on the back is mostly from the pelvis or ureter. Malignant disease occasioning hæmaturia presents sooner or later some physical characters associated with the organ which is affected.

Blood derived from the neck of the bladder or prostate generally remains within the cavity, and if in large quantity forms a clot there, perhaps distending the viscus; or the urine has the colour of porter, and a darker sanies comes away at the close of micturition. When altogether from the prostate, a portion usually issues unmixed with urine by the urethra. In malignant disease of the bladder or prostate, disintegrated shreds of tissue come away with the urine, and occasionally cancer-cells (so called), and the blood is apt to appear suddenly in large quantity. In villous tumour, characteristic shreds of

that growth are sometimes detached; in both this and the preceding case the bleeding is large, and its occurrence irregular, but it is much less so in the latter case than in the former. With villous growth the blood is more intimately mixed with the urine, which is constantly more or less stained. The appearance of a drop or two of almost unmixed blood at the end of passing water may be caused by either calculus or chronic prostatitis; the history, the distinctive symptoms, and the sound will determine which. When the hæmaturia is due to urethral sources, and these are numerous (such as injury to the penis from blows or lacerations, and in falls, with or without fracture of the pelvic bones; chordee; occasionally from rupture in sexual intercourse; from surgical instruments; in some forms of stricture, from severe efforts to pass water; impacted calculus; sometimes in severe gonorrhœa; phagædenic ulceration; and malignant disease), it will be found that although blood is often mingled with the urine, it generally issues from the urethra in a pure state, unmixed with the contents of the bladder, and at other times than during the act of micturition; long and slender clots, also, forming casts of the urethral canal, are often voided.

It is necessary to take care that the colour of the secretion in the alleged hæmaturia is due to blood. Bile, rhubarb, and other colouring matters, also mere concentration, will produce a dark and reddish tinge. The disappearance of the colour by heat, and the precipitate of albumen, indicate blood; but the microscope determines it without fail. For minute quantities, often a matter of extreme importance to identify, in connexion with calculus in its early stage and in other circumstances, the detection of the blood-corpuscle by means of the microscope is the only certain method.

Treatment. Renal hæmorrhage must be treated, when due to calculus, malignant disease, and violence, by absolute rest, in the recumbent position, and by internal styptics, such as gallic and sulphuric acid, and acetate of lead, combined with opium; when produced by purpura and Bright's disease, by iron and other appropriate remedies. Hæmorrhage of the bladder may demand similar general management, if it is considerable; but local means are here more powerful. Thus ice should be applied to the perineum and hypogastrium, the patient maintaining perfect quiet in bed; a little ice-cold water may also be injected into the rectum. It is recommended that a catheter should be passed into the bladder, the clot broken up, and that efforts to remove it should be made by applying an exhausted gum-bottle, or syringe, to the instrument; but such interference is undesirable, unless absolutely necessary from retention of urine. The breaking up or otherwise disturbing a clot is liable to open orifices of vessels closed by recently deposited fibrin, and to provide a fresh cavity into which more blood may be poured. Besides, there is no ground for regarding the clot as a great evil, which must be got rid of at all hazards. The solvent power of urine, possessing a temperature of about 100° Fahr., is very great, and is probably the most efficient and the safest agent in effecting the purpose.

Notes

It does happen, though very rarely indeed, that mechanical means must be adopted to remove firmly adhering coagula, and the bladder has even been opened above the pubes for that purpose; in almost all cases it is wiser to allow nature to do the work, than to be officious in rendering assistance. The distress occasioned to the patient by the urgent wants to micturate is greatly relieved by the use of opium either by mouth or rectum. When it is necessary, however, to use an instrument, a full-sized catheter should be passed, and a syringe, or stomach-pump, adapted to it, by means of which a considerable portion of clot may be gently withdrawn. It should not be forgotten that Sir B. Brodie records a case in which, all other remedies having failed, a dose of Ruspini's styptic, administered internally two or three times in the course of twelve hours, was followed by complete cessation of the bleeding.

Suppression of urine. This term applies only to a condition in which the kidney fails to perform its function of secreting urine. The bladder is empty, or having been emptied, continues so, since it receives no more by the ureters. Meantime the materials of the excretion accumulate in the blood, and the vital powers become oppressed; a comatose state ensues, and finally death, unless the eliminating function of the kidney is resumed, and the urine again excreted. This function is sometimes totally, but only temporarily, suspended; more commonly it is after long impairment by chronic disease gradually extinguished. Advanced chronic disease existing, any sudden shock from operation, however slight, from acute attack, &c., may rapidly induce fatal suppression. The two conditions of suppression and retention have been much confounded. None, however, can be more distinct: in the former the bladder is empty, in the latter it is unnaturally full; in the former no urine is secreted, in the latter the secretion goes on as usual, but some obstacle opposes its removal from the bladder. The symptoms are these: the patient usually complains of languor; fever, vomiting, more or less pain in the back and loins; he is unable to pass urine, or only a very small quantity: he soon becomes drowsy, perhaps delirious, then comatose, and dies in from two to four days if suppression remains complete. There may be anasarca, but often there is none. Catheterism shows that the bladder is empty.

Treatment. Local cupping; but if the patient is in low condition, without abstraction of blood; hot fomentations and counter-irritation to the renal region. The hot-air bath and free purgation, to aid in eliminating excreta from the system. I have seen, in one case only, recovery after forty-eight hours of complete suppression. In the later stage of chronic renal disease, little is to be hoped for from treatment.

The Ureters present very little occasion for notice.

Malformations. The most common deviation from the natural condition is that of increase in number; two or three ureters may issue from one kidney, and may be continued down to the bladder, but much more frequently unite to form one channel. Sometimes

one ureter only exists; sometimes the ureter is incomplete, and forms a canal with a closed extremity. None of these conditions possess interest from a surgical point of view. The ureter is liable to inflammation, which extends by it from the bladder to the kidney. It may be the subject either of stricture or of obliteration, which conditions are generally produced by injury caused by the passage or impaction of calculi; occasionally from pressure by a tumour; rarely from external injury. It is often greatly dilated, when obstruction exists at the neck of the bladder, or in the urethra, from hydraulic pressure slowly acting upon it; and sometimes to such an extent as to become a supplementary reservoir to the bladder. It has even been seen prolapsed into the bladder, forming a tumour there. It may be the subject of malignant and tubercular disease by extension downwards from the kidney, or upwards from the bladder. A calculus is sometimes arrested in its passage through the ureter, occasioning great agony (see Calculous Nephralgia).

THE BLADDER.

Malformations. These are happily not very common, since, of whatever kind, they are the source of great discomfort, and even of misery, to the subjects of them.

1. Absence of the bladder. The organ is sometimes, although very rarely, absent. (a) The ureters have been seen to communicate directly with the urethra; in one case these ducts were somewhat dilated before entering it, in another this condition was not noticed. This abnormality has been only observed in the male sex. (b) Less rarely the ureters have been found entering the rectum, and discharging the renal excretion entirely by that channel. These instances have chiefly, although not entirely, been discovered in the male. (c) A few instances are on record in which the ureters opened directly into the vagina.

2. Two or more bladders, it is said, may co-exist in the same subject as a congenital malformation. Two cases only are recorded which have any title to be so regarded: one of these occurred in a man in whom the ureter of each side appeared to have its own distinct bladder, the two reservoirs being closely united to each other at their adjacent surfaces (Blasius); the other in a woman who is reported to have had five bladders, five kidneys, and six ureters (Molinetti). Other cases reported as belonging to this category were ~~evidently~~ examples of sacculations resulting from long-standing disease. Sometimes the organ appears to be partially divided by a septum, or to be formed of two more or less symmetrical lobes; but

including one ~~abnormally~~ ^{large} ~~reservoir~~ ^{reservoir} with ~~several~~ ^{small} ~~lobes~~

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CASE OF TRIPLE BLADDER.

By DR. G. MACKENZIE BACON.

The subjoined figures illustrate a curious malformation of the Bladder. A detailed account of the case appeared in the *British and Foreign Medico-Chirurgical Review* for October, 1864,* from which the following abstract of the chief pathological appearances is made.

The patient, a man *æt.* 58, died from extensive disease of the kidneys, having had but slight bladder symptoms. On removing the bladder, two openings were observed in its interior (one larger than the other), to the right of, and at its base, and communicating with two separate cavities, from which passed the ureters. Besides these holes, or apertures of communication, there was a smaller one leading to a small cyst formed by a protrusion of the mucous lining of the bladder between its muscular fibres, about the centre of the lower wall—evidently a hernia of the mucous membrane. Of the two larger apertures, the lower one (Fig. 1, B,) was situated in the right lateral wall of the bladder, corresponding with the right angle of the vesical trigone. The upper one (Fig 1, A,) was also in the same side of the bladder, about half an inch from the other, and they both led into cavities continuous with the ureters.

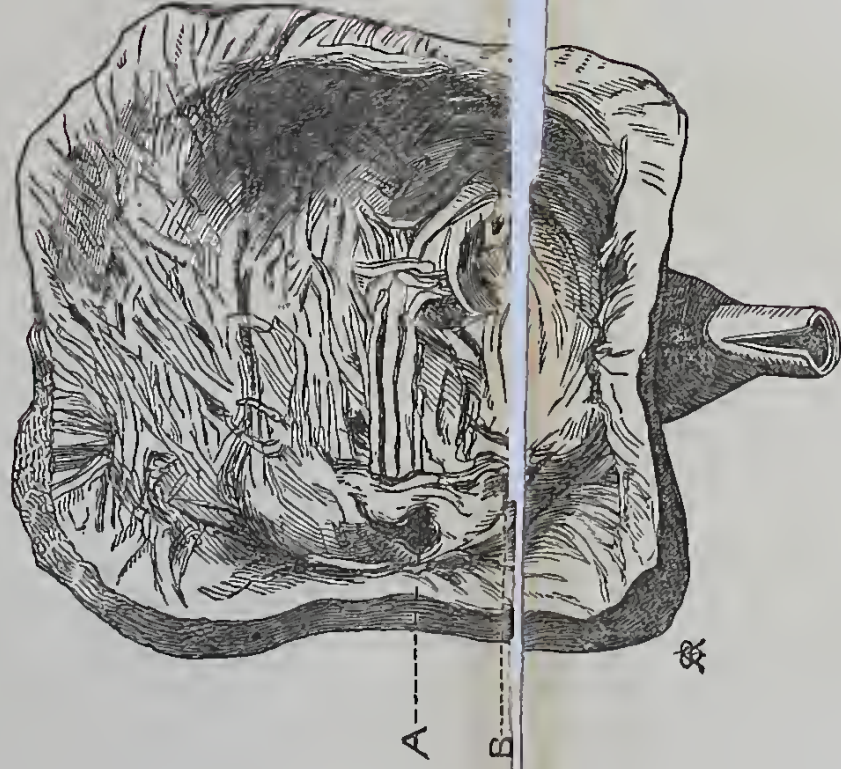


FIG. 1.

FIG. 2.—External view, showing the relative position of the normal and supplementary bladders. B the normal bladder (posterior surface); A. and C., the supplementary bladders, with D. and E., their respective points of entrance into B.

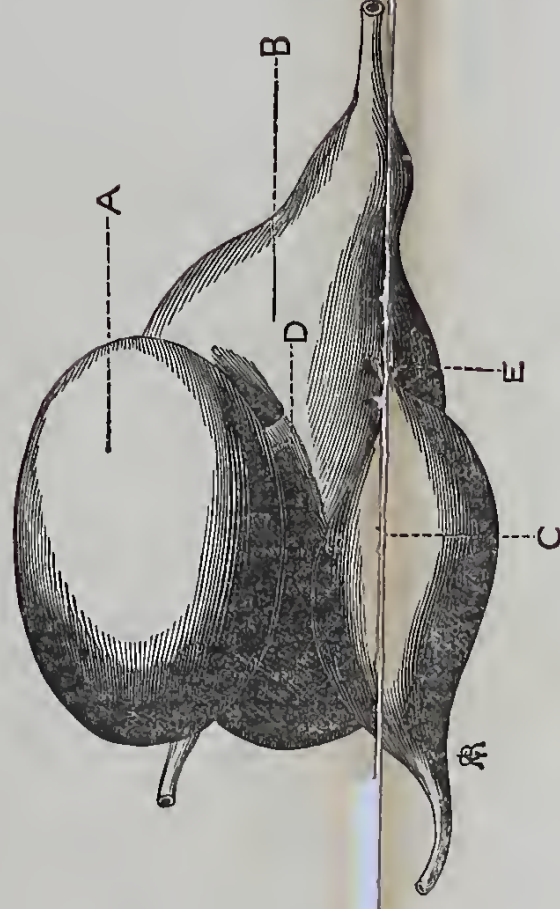


FIG. 2.

THE SUPPLEMENTARY BLADDERS.

The first of these (fig 2, C,) continuous with the opening, fig. 1, B., by means of a small canal, $\frac{1}{4}$ inch long, was of irregular form, measuring $2\frac{1}{2}$ inches in its greatest, and $1\frac{1}{4}$ inch in its least diameter, was situated to the right of, and parallel with the true bladder (fig. 2, B,) and communicated with the right ureter. The other supplementary bladder (fig. 2, A,) much larger and more remarkable, communicated directly with the vesical cavity by means of the opening, fig. 1, A. was ovoid in form, and resembled the physiological bladder. It was 3 inches long by $2\frac{1}{4}$ broad, and situate to the right of, and parallel with the true bladder immediately under the smaller one just described; it communicated with the left ureter, and besides the mucous covering, had a well-developed muscular tunic. Some cellular tissue united these two supplementary bladders to the true one, which latter was much hypertrophied.

The case is adduced as an instance of *multiple* bladder, and was so regarded by Prof. Scibelli, whose views on the subject are stated at full length in the article above referred to.

Fulbourn, Cambridge.

* Account of a Case of Triple Urinary Bladder, by Michael Scibelli. Naples, 1863. Translated from the Italian, with remarks, by Dr. G. Mackenzie Bacon, Assistant Physician, Cambridge County Asylum.

I doubt the true multiple B. seen the by Scibelli's condition of the organ is simply associated with sac, there may be have been two

all in the same position

H3

Scibelli with a mistake

each

EXTRAORDINARY MALFORMATION OF THE
FETAL URINARY ORGANS.

By EDWIN C. MONTGOMERY, L.R.C.S.I.

I VENTURE to send you the following case, because I think it may prove interesting to some of your readers. I would premise that, had it been my intention originally to publish it, greater care and more minuteness should have been bestowed upon it.

About eighteen months since I attended a young woman, who, in the seventh month of pregnancy, gave birth to a fetus, presenting the following pathological appearances:— A large tumour, very firm to the touch, occupied the hypogastric region; on dissection it proved to be the bladder in a state of hypertrophy. It was as large as an ordinary orange; its walls, almost cartilaginous in section, were one-fourth of an inch thick in some parts. The ureters

at the point of entrance into the bladder, and for one inch or so upwards, were dilated to the size of the top of one's little finger. Where the dilatation ceased the tubes were apparently obstructed (this I did not ascertain by actual experiment, but felt no doubt on the matter).

The whole length of the abdomen was occupied on each side by a large body composed *entirely* of cysts, varying from the size of a pea to that of a walnut, and containing a perfectly transparent fluid. I could trace the ureters into these bodies, thus proving the latter to be the kidneys.

Their size, so great was it, and the cystic degeneration they had undergone, so universal was it, surprised me much.

When first called to the mother, I found the feet presenting, and the funis prolapsed and void of pulsation. The child was evidently dead, but as was afterwards proved, could not have been long so. It was, in addition, the subject of talipes varus and hare-lip.

Maidenhead, January 19, 1865.

Dublin
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Hist

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1865

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although these cases, have been often regarded as instances,
~~it is probable that many of these cases, affirmed to be illustrative of~~
 malformation, are in reality also the effects of disease.

3. Extroversion of the bladder. This is the least rare of all the vices of conformation to which the organ is subject. In these cases the anterior wall of the bladder is wanting, while frequently, but not invariably, the pubic symphysis is absent also. The posterior wall and base of the organ are then pushed forward by the abdominal viscera, and form a red and vascular flattened prominence, covered by mucous membrane, in the situation of the pubes. The extroverted portion is in the adult usually about the size of the palm of the hand; the orifices of the ureters may be seen just below the centre, and from beneath the lower margin a short imperfect penis projects, which is flattened, as if cleft in the median line, into the urethra. At the root of the penis a rudimentary prostatic structure exists, the ducts of which can be seen opening into the angle between the bladder and pubes. There is usually more or less hernia of the bowels on either side and beneath the extroverted bladder, into a pouch-like fold of integument, which is covered with hair, represents the scrotum, and contains the testes. The mucous membrane is very sensitive, readily bleeds when touched, and from the projecting orifices of the ureters urine is almost continually distilling over its surface. This condition produces much excoriation of the skin on the parts beneath, besides infecting the patient with a continual urinous odour. The malformation thus described affects both sexes, but appears to be more common in the male. Of eight cases which I have personally examined, two only were in the female. From the condition thus described, there are some slight peculiarities of detail in different cases; but most conform very much to the characters given. The defect is of a less serious character, sexually considered, in the female, as the generative function does not necessarily remain in abeyance; the male, however, is, from the condition of the penis, wholly incapacitated for its exercise.

Treatment of malformations. The results of extroversion may be palliated by well-adapted mechanical means; an artificial reservoir may be employed, but great nicety of fit and capability for adjustment in various positions of the body must be attained by the mechanician. Little can be said, from the results of past experience, in favour of the employment of operative measures to remedy these defects. Mr. Simon, of St. Thomas's Hospital, has attempted, in a male case, to turn back the orifices of the ureters into the rectum; but with results which could scarcely be considered successful, although approximating thereto. Other cases of operation have been fatal. In the female the nature of the operation required is less formidable, inasmuch as the indication is rather simply to cover the bladder than to alter the course of the ureters. Dr. Daniel Ayres, of Brooklyn, U.S., appears to have succeeded in covering the extroverted bladder of a young woman with integuments bor-

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rowed from the neighbouring parts of the abdomen.* The operation consisted in bringing down a flap of skin from the part above, and turning it down over the bladder below, so that the cutaneous surface was in contact with the mucous membrane, and in bringing up the integuments, previously raised by dissection, from each side of the vulva towards the middle line to meet the flap described. The result obtained was a covering to the bladder, and a small opening for the exit of the urine, which admitted with ease the application of an efficient apparatus to retain it. But Mr. Holmes has recently succeeded in covering the part by lateral flaps, in a young male child. Incontinence exists of course as before; but an instrument may now be easily contrived to catch the urine, and he no longer suffers pain or abrasion by friction. I have examined this patient, and consider the improvement beyond question. (See *Lancet*, 1863, vol. i. p. 714.)

Injuries of the bladder. (See vol. ii. pp. 479 et seq.)

Diseases of the bladder. In entering upon a consideration of the numerous affections which range themselves under this heading, I shall adopt the following classification for the sake of perspicuity. We shall study first those diseases which present local anatomical characters, establishing the nature and extent of the lesion which has given rise to the symptoms observed; and, secondly, those more obscure diseases in which similar symptoms occur, but which do not necessarily or generally involve any organic structural changes.

1. Diseases which involve organic structural changes, the existence of which is generally recognised during life, and is always appreciable after death. These may be arranged as follows:

<i>Inflammation</i> (cystitis):	Acute . . .	{ due to injuries and operations.	
		{ " presence of foreign bodies (calculi, &c.).	
	Chronic (a with, and b without, catarrh):	{ " prolonged retention of urine.	
		{ " extension from urethra or kidney, or	
		{ supervening on chronic cystitis.	
		{ " external cold.	
		{ " chemical irritants taken by mouth.	
		{ " " " injected into the bladder.	
		{ as a sequel of acute.	
		as the result of obstruction to out- flow of urine from	stricture of urethra.
			tumours in urethra.
			bar at the neck of the bladder.
			enlarged prostate.
		from foreign bodies in bladder.	calculi or other foreign bodies
			in urethra.
		{	tumours of penis itself.
			from foreign bodies in bladder.
			" growths in bladder.
			" altered urine.
			" paralysis.
			" over-distension or atony.
			" displacement.
			" disease of neighbouring organs (uterus, rectum, &c.).

* *Congenital Exstrophy of the Urinary Bladder.* By Daniel Ayres, M.D. New York, 1859. Prof. Pancoast, of Philadelphia, also operated, with partial success, on an adult male; who however died of a fever before the completion of the treatment.

Epithelium omittit

3 magnant

Suppuration of the bladder.

Abscess of the bladder.

Ulceration, simple and non-malignant, and gangrene.

Vesico-intestinal fistula.

Hypertrophy and sacculation of the bladder: dilatation.

Vesical hæmaturia. (See Hæmaturia.)

Tumours and growths. { 1. Fibrous { warty.
2. Villous or vascular. polypoid.
3. Malignant. Epithelioma.

Tubercle of the bladder. 47

Bar at the neck of the bladder.

Hernia of the bladder.

Foreign bodies in the bladder.

Calculi. (See the essay on that subject.)

Inversion of the bladder.

Rupture of the bladder. (See section on Stricture.)

2. Conditions which do not necessarily involve organic structural changes appreciable by known methods of observation, and sometimes associated with some injury or derangement of a nervous centre.

Paralysis.

Paralysis.

Atony from over-distension, caused by

{	organic obstruction to outlet.
	retention of urine, voluntary or in-
	voluntary, no organic obstruction being present.

"Irritable bladder" (i. e. act of micturition abnormally frequent).

"*Spasm of the bladder*" (i. e. contractions of the bladder involuntary, and exceedingly painful).

Perverted sensibility of the neck of the bladder, or neuralgia.

I shall then consider separately certain effects on the function of micturition produced by the above-named diseases, viz.

Incontinence of urine { in youth.
 { in advanced age.

Habitual engorgement of bladder, and overflow of urine (stillicidium urinæ).

Retention of urine.

Inflammation of the bladder (cystitis): acute. The anatomical seat of inflammation of the bladder is almost invariably the mucous membrane; occasionally, by duration or by intensity of the process, the cellular and muscular tissues external to it may be involved, and perhaps sometimes the peritoneal; but there is no evidence whatever of the existence of any separate and independent inflammation limited to or chiefly affecting the middle and outer coats, as they are anatomically termed.

The mucous membrane, situated near to the internal meatus of the urethra or neck of the bladder, is most frequently, and often most severely, affected. It is so particularly in that very common form of cystitis, viz. cystitis by extension from the urethra, as in

gonorrhœa. In the most severe forms the whole of the lining membrane is affected. This may be found after death simply injected and reddened, or thickened also; or it may have become more or less dark, of a chocolate hue, or even slaty in colour, as when the action has existed for a considerable period of time. Occasionally some lymph is exuded, and membrane-like shreds or patches, and sometimes even an extended layer of this organised product, may be found slightly adhering to the whole surface. In very rare instances such a false membrane has become the cause of retention of urine, and necessitated puncture of the bladder in the male; in the female it is sometimes thrown off entire.

Causes. The traumatic are numerous. Injuries such as blows, and pelvic fractures; operations of lithotomy, lithotrity, and ordinary catheterism; injections: in the female, prolonged and instrumental labours; mechanical irritation of calculus; the chemical action of cantharides and of some mineral poisons, and strong diuretics; action of the urine itself, retained and decomposed, as in stricture and prostatic enlargement; inflammation of adjacent parts, as kidneys, prostate, rectum (?), urethra, especially the last, giving rise to a common but mild variety; from chronic preëxisting inflammation; rarely from external cold, and occasionally from gout.

Symptoms; of the graver form, occurring after operations and preëxisting chronic disease. The invasion is ushered in by rigors, the signs of general fever, followed by perspiring skin. The desire to pass water is very frequent, sometimes quite uncontrollable; the act is excessively painful, often accompanied by rectal pain and tenesmus. Pain is constant behind the pubic symphysis, and in the perineum; also in the sacrum and loins; sometimes in the groin and upper part of the thigh. There is tenderness to supra-pubic pressure, often on the lower half of the abdomen, the patient's legs being raised to relax its parietes; much pain is produced by rectal examination, still more by catheterism. The urine is at first high-coloured, scanty, and clouded; then obviously reddish, like the washings of raw meat; soon purulent and loaded with shreds; while the blood-tint continues, perhaps deepens. Meantime the patient's condition becomes low; he is often delirious; and if the disease is not checked, he dies in from seven to fourteen days. The attack is frequently fatal.

The symptoms of the milder form, which occurs by extension from gonorrhœal inflammation of the urethra, are chiefly local. They are, painful irritability of the bladder, sometimes very distressing; supra-pubic pain; pains in the sacrum, perineum, and thighs; loss of appetite, but not always marked fever. The want to pass

It is in the period /

after
see on page 352
^

in large quantity, associated with relaxation and debility, no inflammation being present, may be controlled by the astringent tonic *uva ursi*; or this agent may be employed with equal parts of decoction of *pareira*. *Chimaphila* is considered by some appropriate in this complaint. The decoction of *senega* I have myself thought superior. In simple irritability of the bladder—that is, when the desire to make water is frequent—in the absence of active inflammation, *uva ursi*, perhaps, affords the best chance of relief. When some inflammation is present (not acute), as evidenced by irritability of the bladder, some little pain above the pubes, and considerable tenderness experienced when a catheter is passed, certain kinds of volatile oil, which are excreted by the kidney and impregnate the urine, are frequently beneficial. One of the mildest, safest, and most easily-digested forms is that found in the infusion of *buchu*, and this is sometimes improved by the addition of a few minims of tincture of *cubebs*, or by a few minims of turpentine or *copaiba*; the latter sometimes exercise a beneficial influence when the *buchu* has failed, more especially in cases where much catarrh is present also.

Dr. Gross employs a combination, sometimes useful in irritable, and even in some inflammatory states of the bladder. One ounce and a half of the leaves of *uva ursi*, and half an ounce of hops, are infused in two pints of boiling water in a covered vessel for two hours; a wineglass to be taken several times a day. Where the cause of cystitis is calculus or stricture, but especially the former, the decoction of *triticum repens*, one ounce of the underground stem, boiled in a pint of water for ten minutes, the whole of the fluid to be taken in twenty-four hours, is often highly serviceable. I have had abundant evidence of its great utility in these, as well indeed as in other forms of the complaint. But it is necessary to bear in mind that most of the vegetable decoctions and infusions should be given in full doses, in order to obtain a good effect; no less than eight or ten ounces daily should be administered, in most cases, of either the *buchu* or the *pareira brava*.

Demulcents are useful by diluting the renal secretion, at the same time that they furnish some little nutriment to the body, and in some instances, perhaps, exert some special therapeutic influence. They are also agreeable vehicles for the administration of acids, alkalies, and other agents, when these are required. Among the most useful are the decoction of marsh mallow, or of the common mallow in its absence; the decoction of carrageen, or Irish moss; the infusion of linseed; the infusion of the bark of slippery elm; the decoction of barley, better known as barley-water; and a solution of gum arabic in water.

The alkalies and the acids are valuable remedies when appropriately given. The old rule of administering the former when the urine is too acid, and the latter whenever it is alkaline, is not to be followed. No doubt, when there is an excess of acid, it may be most effectually diminished and nicely controlled by the alkaline bicarbonate, as well as by the tartrates and citrates; but this is rarely the case in chronic cystitis. It is far less easy to neutralise the alkalinity of urine, the condition most constantly present in catarrh. Some benefit is, however, occasionally to be obtained from small doses of the alkali, even when the urine is alkaline from large admixture of mucous secretions and decomposition of urinary salts in the bladder. If the urine is secreted with its full amount of normal acid, or with excess, it is liable to irritate a vesical mucous membrane whose sensibility is already exalted by inflammation. Hence Dr. O. Rees has proposed to give in such cases enough alkali, such as the citrate of potash, to neutralise the acid reaction of the urine, so that this cause of irritation may be removed; and in some cases a certain benefit is thus attained. Care must be taken, however, not to produce alkalinity of the urine, which it is our object to diminish. The mineral acids have less influence on the reaction of the urine than is generally supposed. Large quantities of nitric or of hydrochloric may be given, without producing any result whatever on the reaction of the urine. The benzoic acid is more certain, and often produces the desired effect when the others have failed. Lemon-juice in full quantity has a similar power in these circumstances.

In almost all instances, the patient should have light and nutritious diet; and sometimes the moderate use of stimulants is called for. It is of great importance to maintain the digestive system in good order, and to avoid obstruction of the abdominal viscera; an occasional dose of blue-pill is sometimes very serviceable to the patient. Rest in the recumbent position, and abstinence from all exertion, especially walking or riding, are in themselves matters of the first importance in treatment.

Suppuration of the bladder is that condition in which the catarrh, already described, consists mainly or entirely of a purulent secretion. It is to be treated chiefly with local mild astringent injections, and has been sufficiently considered with the last subject. The larger the proportion of pus in the fluid of catarrh, the graver is the existing affection.

Abscess of the bladder. Occasionally deposits of pus occur in the walls of the bladder; these are always the result of preëxisting severe disease, usually of a chronic character. Their existence is rarely to be diagnosed or even suspected during life, and no special treatment is indicated.

Ulceration of the bladder. This is by no means a common affection, and seldom occurs except in the last stage of urethro-vesical disease, arising from obstruction when, after long-standing inflammation of the mucous membrane, ulceration takes place. It may result also in advanced tubercular and malignant diseases of the bladder; the ulceration following softening of the tubercular deposit, and disintegration of the cancerous growths. A simple form of ulcer has been observed to occur from permitting a silver catheter to remain with a large portion of the instrument within the cavity of the bladder, upon the mucous membrane of which it has rested or impinged for some days. Signs of ulceration are, blood in the urine, severe pain at a fixed spot, constitutional depression, usually soon ending in death. The urine contains débris of mucous membrane; and if the ulcer increases rapidly, or the tissues become gangrenous, there is much foetor and dark sanious matter mixed with the excretion. Instrumental explorations are exceedingly painful; there is constant desire to pass water, and the effort produces often severe agony.

Treatment. Stimulants and support for the general condition; full doses of opiates, by mouth and rectum; small doses of alkali internally, and diluents; no unnecessary mechanical interference to be permitted.

Vesico-intestinal fistula. Fistulous openings sometimes form between the bladder and some portion of the intestinal canal. The result is, that some of the liquids from this latter source enter, at first in minute quantity, and give rise usually to much irritability of the

bladder, and other symptoms of subacute cystitis. These are sometimes the earliest signs of the existence of an abnormal communication. If the urine is examined at this early period, fragments of vegetable and of animal fibre may be discovered under the microscope. I have myself been able to diagnose at an early stage, in otherwise doubtful circumstances, the existence of vesico-intestinal fistula by this means. Usually the symptoms become gradually more severe, and the faecal odour and colour are communicated to the urine. At length, considerable fragments of faecal matter enter the viscus, become partially dissolved there, and pass through the urethra. I have seen several cases of this distressing condition, both in the male and in the female, but chiefly in the former; and in these, carcinomatous disease in the abdomen has been the most frequent but not the only cause. For adhesion may take place between an ulcerating bowel and the bladder; and the ulceration may extend into the latter, no cancerous disease being present.

Treatment. Little can be said in relation to this matter. The lesion having been determined, instrumental interference is—except under special necessity, such as for the purpose of removing foreign bodies from the bladder, which are a source of great misery—to be shunned. The use of purgatives is also to be avoided; but the bowels should be maintained, as far as possible, in the natural condition. The food is to be such as will nourish the body without producing a large and coarse residue of faecal matter. In one case under my own care, in which a gentleman passed for several months the whole of the faeces by the urethra, a great amount of suffering was occasioned by swallowing indigestible substances, like grape-stones and husks. Subsequently, by a careful selection of fluid nutriment, the most painful features of the case were much ameliorated. Now and then washing out the bladder with small quantities of tepid water gently thrown in contributed to the patient's comfort. In this case the ulceration was not due to cancer.

Hypertrophy and sacculation of the bladder, dilatation, &c. The muscular walls of the bladder become hypertrophied in most cases of obstruction to the outlet. Increased force being necessary to expel the urine, the organic fibres are augmented in proportion to the action required. Hence the vesical coats may be seen rugose and columnar, resembling in appearance the left ventricle of the heart; and they may reach half an inch, and sometimes even an inch in thickness. From the interlacing of the fibrous bands which constitute the parietes of the bladder, it often happens, when hypertrophy exists, that the mucous membrane is forced by pressure into the interstices between, and that gradually saeculi are formed. These at first are very small, but if the action is continued and powerful, they become large in size, protruding, in the form of tumours, beyond the periphery of the bladder, and forming additional reservoirs for the urine. A sae, or sacculus, may thus sometimes attain the size of a healthy bladder, although the communi-

cation with the original viscus is by a comparatively small orifice. When large, its structure is chiefly mucous membrane and cellular tissue; here and there a few muscular fibres sometimes cross the tumour. Sacculi not unfrequently become receptacles for calculi, and are always so for urine, which is unduly retained by them, and becomes a source of irritation. There is no special sign by which their existence can be certainly diagnosed, although it may be suspected; neither is any specific treatment requisite beyond that necessary to all those cases in which the bladder fails to expel its contents, and is the subject of chronic inflammation.

In addition to hypertrophy, the walls of the bladder are sometimes thickened by a deposit of lymph from inflammation; a circumstance which impairs, and almost destroys, the muscular action of the viscus. Very frequently the bladder is simply dilated, and even distended, as a result of obstruction, the walls being thinner instead of thicker than natural. This condition occurs, not in stricture, but in those cases of enlarged prostate where, by reason of the size of the prostatic mass implicating the muscular apparatus at the neck of the bladder, the viscus is incapacitated from contracting, and suffers passive distension. Hypertrophy does not then take place because muscular action is impossible, or nearly so.

Vesical hæmaturia (see *Hæmaturia*, p. 335).

Tumours of the bladder. These affections may be classified as follows:

1. Fibrous growths, of a warty and of a polypoid character.
2. Villous or vascular growths.
3. Malignant growths.

1. *Fibrous growths* are rarely met with, but the few specimens preserved in our museums indicate the classification presented here. They are non-malignant in character, causing injury and almost always death solely by the obstruction they occasion to the urinary outlet. They are connected with the mucous membrane and sub-mucous tissue, and are made up of elements normally belonging to the latter. They appear to commence in the form of simple circumscribed elevation of the mucous membrane, resembling a warty growth; and, subsequently, they enlarge, protrude, and assume a polypoid form. A single anatomical preparation may afford examples of all stages of development between the earliest elevation and the fully formed polypoid tumour. There is no analogy whatever in origin or structure between them and the uterine growths; nor between them and the polypoid outgrowth, which is frequently found springing from the posterior part of the prostate.

The case of Mr. Allen ~~at~~ B 319. shows that the case
may last 9 years with but little pain while ~~for~~ the case VI
such transactions at had been under my care, ^{VOL VIII p 262.} & ~~apparently~~ suffered
severely, apparently because ⁱⁿ ~~the~~ ^{it} the growth produced
obstructions - the ^{symptoms are} ~~was~~ of 12 ~~3~~ ^{1/2} yr duration. but in a class of
persons who are life long perhaps. & who have less
resources of aid & apt. compl. than Mr. Allen had.
The cath was passed daily for months together at a time
Mr. Allen - the blood came of two ^{large} quantities, & at
some times was quite abundant - It was evidently of injurious
kind. of Ay suit - (as is the case in Epithelioma)
A little thickening, was felt during life behind prostate w
conspicuous & - site of tumour -

The *symptoms* are those common to all forms of obstruction to micturition, added to the special signs of foreign body in the bladder. Careful sounding may detect their position and form, and will prove the absence of stone. The complaint is most frequent in children and young people. Unlike the villous and the malignant growths, they rarely give rise to blood in the urine.

Treatment. No special curative treatment is applicable in the male subject of these growths; much may be done to palliate the symptoms and to support the powers of life, by adopting those means which are fully detailed in considering the effects of obstruction under the heads Stricture, Enlarged Prostate, and Chronic Cystitis. In the female, a growth of this kind has been removed by ligature, the urethra easily admitting the requisite degree of dilatation.

2. *Villous growths.* These have usually been classified as “malignant,” but have no claim, either by their structure, their action, or by the presence of constitutional cachexia, to be so considered. The villous growth of the bladder is a soft, flocculent body, about the size of a large marble when fully developed, made up of innumerable villous processes, floating in water and branching off in every direction from the base, which is connected solely with the mucous and submucous tissues. These villi are identical in structure with the villous processes of the chorion in its normal state, and are very vascular. Several such tumours may coexist in one bladder; and the whole or a large portion of the mucous lining of the organ may, if closely examined, be found more or less studded with small villous processes, similar to those of the tumour itself.

The *symptoms* have nothing special to distinguish them from those of other tumours, excepting the frequent or almost constant appearance of some blood in the urine without provocation. Indeed, death occurs rather from hæmorrhage than from obstruction in these cases, as well as in part from the exhaustion which the severe pain, which is always present, induces. Small shreds are frequently found in the urine, which, under the microscope, sometimes present appearances indicating the nature of the disease. The growths are too soft to be identified by the sound, and instrumental interference almost always greatly aggravates the symptoms.

Treatment. The indications are, to allay pain, to subdue spasmodic action of the bladder, to prevent hæmorrhage by internal remedies, and to counteract its effects on the system by chalybeates and nutritious diet. Astringent injections very carefully introduced into the bladder, such as weak solutions of acetate of lead or of nitrate of silver, may be tried; they are, however, not to be repeated more than once or twice, unless marked benefit is observed, and signs of vesical irritation have not been produced by their employment.

3. *Malignant disease of the bladder* is more frequent than the

growth just described. Sometimes it is primary, commencing independently in the bladder; at other times it is secondary, extending from the prostate, from the uterus, or from the rectum. The species may be scirrhus, but is usually encephaloid when originating in the bladder; always the latter when spreading from the prostate; when from the rectum, it is commonly scirrhus; from the uterus, the same, or epithelioma. Colloid is said to have existed, although it must be extremely rare. The disease generally runs a rapid course, and presents the constitutional characters significant of malignant action. In cases of encephaloid a large mass is soon formed, which sometimes almost fills the cavity of the bladder.

Symptoms. One of the most strongly-marked signs of this affection is hæmorrhage into the bladder, generally occurring suddenly and in large quantities, rather than by frequent or continuous oozings from capillary vessels, which latter mode is more characteristic of villous growths. The pain is also very severe and lancinating, and is referred as much to the loins, back, and thighs as to the pubic and perineal regions. All the signs of obstructive disease and chronic cystitis are present. Constitutional cachexia accompanies the local disease in its advanced stage; glandular enlargements are usually distinguishable in the iliac regions; and the patient suffers from loss of blood and rest. Small portions of disintegrated tissue and bloody sanies are often voided from the bladder; occasionally cells may be found in the urine, which, when examined by the microscope, seem to indicate the specific character of the disease; but the diagnosis is generally tolerably clear without the somewhat questionable support which is to be derived from this source. Without in any respect undervaluing the utility of microscopic examination, I am compelled unhesitatingly to conclude, after long experience of its application to these cases, that not much stress must be laid on the indications which cell-growths in the urine afford in respect of the presence of malignant or non-malignant disease in the urinary passages.

The principles of *treatment* vary in no respect from those which have been laid down under the head of villous tumours. Opium in some form, administered both by mouth and by rectum, and occasionally by injection into the bladder, is of great value in alleviating the severe suffering; and must usually be given towards the later stages of the complaint with great freedom. In all those complaints of the urinary organs where little or nothing remains to be done but to alleviate pain and support the powers of life, the remedies necessary should be given with no sparing hand. So severe is the anguish which the patient suffers if left to the action of his complaint, unchecked or only partially checked by anodynes and anæsthetics, that it must be regarded as cruel to deprive him of their aid in mitigating his distress, so far as they can be made available without danger to life; while at the same time alco-

x Epithelioma primary of
the Bladder - a capital
case

F. pt 342. Dr John Kirby
at Bath for 1806 Dec 4

water must be complied with instantly, and is extremely painful. The urine is cloudy, and deposits more or less mucus and pus. It may be fairly supposed that in this group of symptoms the mucous membrane of the neck of the bladder is chiefly affected, and not that of the entire viscus; the most common termination is resolution; while in the more serious form described above, the whole of the mucous membrane is affected, and perhaps some of the tissues subjacent; it may also become ulcerated or gangrenous in the worst cases.

Treatment, of the milder form. A tolerably active mercurial purge at the outset. Leeches to the perineum, if the attack is rather severe, followed by hot poultices, and perfect rest in bed. Hot hip-baths twice a day, 100° to 105°, or more. A moderate supply of diluent drinks, as barley-water or linseed-tea, with a little citrate of potash, say one drachm daily; no saline diuretics, but small doses of antimony, at the outset only, if the attack be severe. Hot linseed-poultices to the hypogastrium, if there is much pain there. If the irritability of the bladder is great, half-drachm to one-drachm doses of the tincture of hyoscyamus every two or three hours should be taken until it is mitigated; this failing, opium and hyoscyamus suppositories or small enemata may be administered. The diet should be light but not lowering. As the acute stage passes off, the effect of buchu may be watched, in one or two ounce doses four times a day, and then of small quantities of tincture of cubebs in addition, or of capivi, giving twenty minims of the former, or five to eight of the latter, thrice daily. In the severe form, the treatment advised above is to be adopted at the commencement; but if the general fever heightens, and symptoms of depression appear or threaten, support and alcoholic stimulants must be given freely, and large hot local fomentations, constantly maintained, should be substituted for the hip-bath; morphia, by the mouth, is usually necessary to tranquillise the system, with warm enemata daily to unload the bowels. Retention must be watched for, and the catheter, a soft gum elastic one, employed if necessary; but never unless it be really required. If there are signs of renal inflammation, the appropriate local treatment must be vigorously applied.

Cystitis resulting from cantharides locally or internally absorbed comes on usually within two to four hours after the dose; the symptoms resemble those of gonorrhœal cystitis, soon reach their maximum of intensity, and subside in from six to twelve hours. When at the worst, the spasmodic ejection of the urine, as soon as a few drops have accumulated in the bladder, is excessively painful. If the dose has been large, blood appears in the urine, but not otherwise; sometimes shreds of lymph also. The treatment consists in bicarbonate of potash and full doses of hyoscyamus every half-hour for three or four hours, and perfect rest; all movements of the body aggravate the symptoms. It is highly important, if a blister has been the cause, to remove it at once, and to sponge well the surface in order to detach every particle of the cantharides which may be adhering to the skin.

Chronic cystitis. Of all urinary affections, this is one of the most common, since it is apt to complicate almost every other at one time or another. Its causes also are numerous and varied. First of all, on the subsidence of the acute form, a chronic condition commonly supervenes, and may continue for a very considerable period. Next, all forms of obstruction to the exit of urine produce chronic cystitis, by confining the urine until it becomes slightly decomposed,

and consequently irritating to the mucous lining of the bladder. This condition is intensified if the contractions of the bladder are also unusually frequent and painful. Inability to empty the viscus, from paralysis or atony, when no obstruction is present, acts in a precisely similar manner. If the urine is unduly acid or alkaline; if it be loaded with deposits from the kidney; sometimes if diluted or watery; if it be morbid, as in Bright's disease, or charged with irritating matters, such as diuretic salts, &c.,—chronic cystitis may be induced. Foreign bodies in the cavity of the bladder powerfully excite this disease; also tumours of all kinds, simple and malignant. Diseases of the rectum sometimes, such as piles, prolapsus, and cancer, those of the uterus also, by causing pressure, and *à fortiori* when implicating the coats of the bladder, are among well-recognised causes. The bladder is sometimes, although rarely, displaced by adhesion to neighbouring parts, as to the intestine, usually to a portion of the lesser bowel; or it may be forced into a hernial protrusion: in either case its contents are partially retained by pressure, and thus produce more or less of the affection in question.

The structure affected is the mucous membrane lining the bladder; rarely is any other implicated. After long-persisting inflammation, especially the catarrhal, it is thick, velvety, and dark in colour, its vessels being loaded, while the underlying fibres are usually hypertrophied. Chronic or subacute cystitis appears in two distinct forms: the first, an ordinary inflammation, in which a more or less active hyperæmia, hypersensibility, and very slight increase of secretion, are the main elements; the second, often a condition succeeding to this or to the acute form, in which a passive or congestive hyperæmia from local debility in the capillaries, some hypersensibility, and an *inordinate secretion of mucus* mingled with pus in varying quantity, mark the complaint. The latter form is popularly recognised as catarrh of the bladder, and is sometimes called also cystorrhœa.

The first, or *simple chronic cystitis*, is in fact the condition which exists in most cases of irritable bladder, be the cause what it may. Wherever undue frequency in micturition exists, together with increased mucous secretion or with pus, from the bladder, however small the amount, and by the microscope it may always be detected (the signs of the acute disease being absent), there is present subacute or chronic cystitis. Any source of irritation in or near the bladder may give rise to it; and the cause being removed, the effects generally soon cease also. Ordinarily its removal is hastened by rest, hot hip-baths, local fomentation, mild aperients, and sufficient alkali

to neutralise the natural acidity of the urine or nearly so, not to render it alkaline; if necessary, the use of buebu, triticum repens, enbebs, or capivi, in small doses, may be adopted. The second and more severe form of the complaint, however, is that in which the question of treatment becomes wide and important.

Chronic cystitis with increased secretion: catarrh. The condition of the mucous membrane has been already described. Respecting the nature of the discharge itself, much difference of opinion has been manifested by different writers. Its naked-eye characteristics are well known. At the bottom of the vessel into which the urine has been passed, a quantity of semi-transparent, tenacious, ropy material, very much resembling the white of an egg, is soon deposited. On pouring off the contents of the vessel, it is seen at first to adhere to the sides; but soon it slides down in a mass, almost resembling jelly, and then falls out suddenly and heavily. This material has been regarded by some as simple mucus; by others as prostatic secretion; and more recently as merely pus altered by an alkali. None of these descriptions appear to be correct. No doubt it contains a considerable admixture of pus; but it is by no means identical with a specimen of that secretion to which alkali has been added, although there is a strong apparent resemblance between the two products. The mucous membrane of the bladder in these cases appears to secrete, as the bronchial membrane is also prone to do, much of a homogeneous structureless fluid, containing numerous pus corpuscles and young epithelial cells; but the proportion of the liquor to the corpuscle is much larger than in ordinary pus. The old term, mneo-pus, describes it perhaps more correctly than any other.

Causes. An attack of acute cystitis; permanent obstruction of any kind, causing retention, stagnation, and decomposition of the urine; calculi and other foreign bodies; tumours in the bladder; spinal paralysis, not only as a cause of retained urine, but as occasioning perverted action of the mucous membrane by impaired nervous supply; and all causes which produce a long-continued irritation of the organ.

Treatment. The inflammation is of chronic and atonic character; depletion and antiphlogistic remedies are therefore contra-indicated. On the contrary, the treatment should be mainly tonic and astringent. It is also more topical than general, since the remedies taken internally appear to act mainly, if not entirely, by their local influence, impregnating the urine which is retained in the bladder. It will nevertheless be advantageous to regard it under two heads, as topical and as general treatment.

1. *Topical treatment*, strictly so called. One important indication in the treatment of this affection is to maintain the mucous membrane of the bladder as free from inorganic or other deposit as is possible. The urine itself also, if alkaline and irritating, must not be permitted to remain in constant contact

with the diseased membrane. It is therefore desirable to introduce the catheter for the purpose, first, of insuring the complete contraction and evacuation of the bladder, if its own efforts do not accomplish this; and secondly, to remove morbid deposits by injecting warm water, and washing out the interior of the viscus. This is often productive of great comfort to the patient; and increased benefit may sometimes be obtained by cautiously impregnating the water so employed with astringent or sedative agents. Of the former kind, one of the best is the acetate of lead, commencing with one-sixth of a grain to the ounce of water; next to this, the nitrate of silver, commencing with one grain to eight ounces of distilled water; or, nitric acid may be used, in the proportion of one or two minims of the strong acid to ten ounces of water. By slow degrees the nitrate may be increased as far as to one grain to the ounce in some obstinate cases, and with much advantage. After washing out the bladder with plain water, at a temperature of about 98° or 100° (a common catheter and gum-bottle, with nozzle and stop-cock, answers every purpose), about two or three ounces of the fluid, which should have the same temperature, should be slowly injected, and, after remaining two or three minutes, be allowed to flow out. One drop of carbolic acid to half a pint of water is a useful injection when the urine is fetid.

If anodyne solutions are indicated in order to allay much pain or great frequency of micturition, the extracts of conium, hyoscyamus, and opium, singly or in combination, may be used. A formula which I frequently employ is the following: Dissolve one drachm of each extract, conium and hyoscyamus, and half a drachm of extract of opium, in two drachms of proof-spirit and fourteen drachms of water; of this solution, add a sixth or a fourth part to three ounces of warm water for an injection, to remain in the bladder five minutes; two-thirds should then be permitted to flow out, and the catheter withdrawn: the rest is retained in the bladder.

All the manipulation connected with these processes must be of the most gentle kind, otherwise more harm will be done by the manual interference, than good by the therapeutical element. And where the plan is manifestly not producing some marked benefit after a few trials, and, *à fortiori*, if it increases the symptoms, the application must be discontinued.

It should be borne in mind, however, that on all occasions of washing out the bladder, a small quantity of liquid only, such as two to three ounces, is to be injected. This may often be highly useful, while the employment of double this quantity may be productive of nothing but mischief. The bladder is usually more or less irritated by throwing in so much as five or six ounces; and it is on this account that I have long ceased to employ injections in lithotomy, save in a few exceptional cases; a plan which is attended with no little benefit.

Counter-irritation is not very manageable in these cases, although sometimes useful. I have employed a Burgundy-pitch plaster, croton-oil in soap-liniment, and strong tincture of iodine, over the pubes, the latter to the perineum also, with some advantage, after shaving the hair. Cantharides, it is said, must be avoided; but I have found no disadvantage from its application to the perineum in the form of the strong acetum lyttæ; and where the inflammation chiefly affects the neck of the bladder, it has sometimes an excellent effect. No better application to the pubes for general purposes exists than a hot linseed-poultice, the surface of which has been sprinkled with mustard.

The pain and loss of sleep often present demand the use of opiates either by mouth or rectum, and generally also such use of aperients as the system demands in consequence. Each case requires often a different treatment; some experiencing more relief from opium by the mouth, others from suppositories or small enemata. Opium alone, or with belladonna, or conium, or hyoscyamus, may be administered often with the best results through the rectum, and with a most tranquillising effect on the bladder.

2. *Internal remedies.* Among the most popular are the infusions of buchu and uva ursi, and the decoction of pareira brava. The indications for their use appear to be the following: chronic mucous discharge from the bladder

holic stimulants are in some cases less valuable than opium in enabling him to endure the progress of his malady.

Tubercle of the bladder. One of the rarest of the affections of the bladder is tubercular deposit; probably it never occurs unassociated with tubercular disease in other parts of the body; indeed in almost all—perhaps it may be said in all—cases, other parts of the urinary system are similarly affected, and these are generally the kidneys and prostate. In women it has been found to have followed primary disease in the uterus. The disease commences by a deposit in the coats of the bladder of small tubercles: these become numerous and coalesce; subsequently the morbid material softens, the mucous membrane gives way, disintegration takes place, and a ragged ulcer ensues; a large extent of the inner coat being sometimes destroyed before death.

The symptoms of this disease are not peculiar; and the diagnosis depends rather on negative than positive signs. The absence of much or frequent hæmorrhage may serve to distinguish it from malignant and villous tumours. Great pain and extreme irritability, frequency in making water, the absence of calculus or other foreign body in the bladder, as ascertained by sounding, together with the presence of tubercle elsewhere, and progressive emaciation, and lastly the patient's age, usually early or middle adult life, will serve to indicate the true character of the disease.

Treatment. That which is adapted for constitutional tuberculosis in relation to the general health. For the local complaint, anodynes, the remedies for chronic cystitis, rest; and no mechanical interference when the diagnosis is tolerably clear.

Bar at the neck of the bladder. The enlargement of the prostate, common in old age, often produces an elevation of the structures, sometimes amounting to a distinct ridge, which exist at the inferior aspect of the neck of the bladder. A bar may be thus said to be formed there; nevertheless, it has not been usual in this country to apply that term to any product of the enlarged prostate; it has been thought more desirable to reserve it rather to denote any bar which may exist in the spot described, but which is not prostatic in its character. Such bars occasionally exist, and usually in elderly subjects. Mr. Guthrie was the first to point out this fact. He believed the bar to consist in disease of "the elastic structure," existing at the neck of the bladder, and as such to be quite distinct from the very common complaint already referred to. After considerable study of this question, I cannot but consider the non-prostatic bar as extremely rare, since almost all permanent obstruc-

tions at the vesical neck are due to enlargement of the gland or to its effects; nevertheless, in very exceptional instances the bar in question is undoubtedly to be met with.

In all long-continued diseases of the urethra and bladder it is common to find a hypertrophied condition of the uvula and associated muscular fibres, and more or less elevation at the neck of the bladder, or bar, as its consequence; but this is not to be regarded as an example of the disease in question.

The treatment mainly consists in combating the symptoms of chronic cystitis which may arise, and occasionally passing a large catheter, so as to insure a patent condition of the neck of the bladder. Mr. Guthrie and others have proposed to divide the bar by incisions; but the rarity of any true barrier here, apart from prostatic enlargement, will induce extreme caution in affirming positively the presence of this affection during life; and any severe surgical operation for its relief could only be contemplated in presence of very serious symptoms as its undoubted effect. The subject of operations for relief of obstruction at the neck of the bladder is considered at the close of the section devoted to treatment of the enlarged prostate of age.

Hernia of the bladder is a rare affection, liable to occur in both sexes: in the male, as inguinal; in the female, usually as vaginal hernia, although it may be femoral. In the former it generally forms part of a large mass occupying the scrotum, pressure on which sometimes evacuates the portion of urine which is liable to be retained in that situation, the bladder occupying in part the pelvis, and in part the scrotum. It may be associated with a hernial protrusion of bowel, or may exist independently of this. In the former condition it has been met with in the operation for strangulated inguinal hernia, and has even been opened by mistake, as in one of the two cases recorded by Pott. The portion of bladder forming the hernia always escapes from beneath the peritoneum, and consequently is never found covered by that structure. In cases which are detected early, a truss may be successful in retaining the viscus within the pelvis; where permanent adhesions in the anomalous position have taken place, mechanical support is to be applied to prevent further protrusion.

Inversion of the bladder. This is an exceedingly rare affection, and is found exclusively among female children. Three cases only have come to my knowledge;* their ages when first seen were from two to four years, although the condition probably commenced at a very early age. The bladder is gradually prolapsed and protruded through the urethra, which becomes much distended, until the viscus presents the appearance of a pyriform, red, and vascular tumour.

* *Lond. Med. Gaz.* 1833, Jan. 19; *Trans. Prov. Med. and Surg. Assoc.* 1846, by Mr. Crosse, with plate; *Lancet*, 1862, vol. i. p. 250, by John Lowe, M.D.

One of these cases narrowly escaped the application of a ligature, on the supposition referred to; but on careful examination the orifices of the ureters were discovered, and reduction was accomplished by manual pressure. Considerable incontinence existed subsequently in the two former; but in the third it occurred to the Surgeon (Dr. Lowe, of Lynn) to apply a heated iron to the urethra (in all five times), and to maintain a silver catheter with a bulbous extremity in the bladder, between two and three weeks; by which means the viscus was maintained in its place, and cicatrisation of the dilated canal ensued. The bladder was enabled subsequently to retain some ounces of urine, and slight incontinence only remained.

2. Conditions which do not necessarily involve organic structural changes, appreciable by known methods of observation, and which are generally associated with some injury or derangement of a nervous centre.

Paralysis of the bladder. One of the most common terms used in relation to complaints of the bladder is paralysis. Yet true paralysis of the bladder, some lesion of a nervous centre being absent, is one of the most uncommon affections. Indeed the word is loosely, not to say incorrectly, employed. For example: the bladder when unable to evacuate its contents from obstruction by stricture, or by prostatic enlargement, or by atony from over-distension, is commonly said to be "paralysed," although there is no derangement of the nervous supply; to which condition the use of that term ought, in accordance with our employment of it elsewhere, to be limited. The bladder may possess its normal contractile power, but be unable to overcome an abnormal obstacle in the outlet, and so fail to expel its contents; the complaint in this case is not paralysis of the bladder, but solely obstruction in the channel of exit—two totally different conditions. This distinction must be clearly kept in view in our consideration of this subject.

True paralysis of the bladder is a condition in which the contractile power of its muscular fibres is lost or impaired from failure of nervous supply; thus there may be partial as well as total paralysis. The usual cause of this accident is cerebral or spinal lesion. It happens in some injuries to the brain, in almost all serious injuries of the spine, in softening, in apoplexy, and in all serious organic affections involving those parts of the cerebro-spinal system which affect the urinary apparatus. It occurs from spinal debility produced by excesses, especially of a sexual kind; also in temporary functional derangement of the nervous centres; through the agency

of reflex action from some adjacent source of irritation, as in hæmorrhoids, and especially after operations for their removal ; and after other operations ; although in some of these cases the retention is probably due rather to spasm of the constrictor muscles than to paralysis of the bladder. It may also happen after shock to the system from any source, in fevers, &c.

I have met with a single case of permanent paralysis of the bladder attributed to an overdose of belladonna. Certain it is that the effect of hyoscyamus and belladonna is frequently to produce temporary paralysis ; and in this manner they combat undue irritability of the organ, for which they are so constantly prescribed. It is extremely rare, however, to meet with an example of true limited or local paralysis (the temporary conditions just referred to only excepted) of the bladder, either affecting the body of the organ alone, producing retention ; or of its neck alone, producing incontinence ; or of the entire organ, the result of which is also retention ; which latter is observed in cases of spinal injury. Notwithstanding that such conditions have been elaborately described, and regarded as common occurrences, the true pathological lesion is in almost all cases atony from over-distension, and not paralysis (see next section).

Treatment of paralysis. From whatever cause, the first duty is to empty the bladder, by means of the catheter, twice or thrice daily. It should be employed with great care ; for the patient has probably lost sensibility, and cannot indicate, by complaining of pain, when injury is inflicted ; while the urethra is often in a lax state, and consequently a slight laceration is easily made. A full-sized instrument, either gum or silver, whichever is found to pass most easily, must be employed. If signs of chronic cystitis manifest themselves, the appropriate remedies must be employed, especially the local ones, among which washing out the bladder, followed by very mild astringent injections, may be reckoned as the best.

In cases not traumatic, or depending upon acute disease, strychnia, steel, cantharides, ergot of rye, and arsenic, deserve a trial. Galvanism, cold douches, and blistering, should also be employed as local agents.

Atony from over-distension. Organic obstruction having existed either at the neck of the bladder (enlarged prostate), or in the course of the urethra (stricture), during a considerable period, and having gradually augmented in amount, the contractile power of the bladder becomes insufficient to expel all the urine, and a portion is left behind at every act of micturition. This goes on increasing until, in some cases, the amount so remaining, technically called "residual urine," reaches twenty or even thirty ounces ; it then begins to open out the neck of the bladder, and some of it runs off during sleep, or when strong muscular efforts are made. The fibres of the bladder being unequal to the task of expelling the urine through

the narrowed channel, and, not having been permitted to resume the natural condition of complete contraction, are over-stretched, lose their tone, and, even on the obstruction being removed, cannot expel the contents of the viscus. A similar state may be produced when no organic obstruction is present, from long-continued retention of urine exerted voluntarily, or occasioned by temporary spasm, or by some cerebral affection, in fevers and the like. The patient whose bladder has been thus over-distended, often finds himself unable to empty it subsequently. Such is the condition termed here atony, and often falsely called paralysis, which affection has been already considered in the preceding section.

Treatment. It is essential, in the first instance, to insure the complete emptying of the bladder for a time, at least once or twice daily. The muscular fibres must be enabled to resume their normal condition of contraction from time to time; and this never can take place unless the bladder is artificially emptied. Sometimes, if the over-distension has not continued too long, they gradually regain their tone, or at least recover much of it. When the abnormal state has existed long, it may be often greatly benefited, but is rarely completely removed. Without the mechanical aid all medical treatment is absolutely useless, but it may perhaps be useful in combination with the former. The general and local stimulants of nervous action, already advised in paralysis, should be employed in this affection also. The cold douche over the lumbar spine and on the abdomen is sometimes particularly useful. Injections of cold water into the bladder itself are the best of all direct applications to the viscus.

Irritable bladder. This term is often very loosely employed to designate some specific affections of the bladder. Like the term "dropsy," "irritability of the bladder" denotes nothing more than a symptom; in either case the real cause must be discovered; the terms themselves conveying no meaning beyond the simple fact, in the former case that a collection of water is present, in the latter that the patient passes urine too frequently. Irritability of the bladder is a symptom present in almost every affection of the urinary organs, from childhood to old age; and it is named here at the head of a section solely on account of the conventional misappropriation of the term, and as affording an opportunity of protesting against it. Nothing is more common, even in professional communications, than to be asked what is the best remedy for "irritability of bladder." It denotes no special pathological state, and always requires to be considered in connexion with the other symptoms which are allied with it, before a diagnosis of the existing complaint can be made.

Spasm of the bladder denotes another symptom, but this term is less frequently misapplied. It implies that the contractions of the bladder are involuntary, uncontrollable, and exceedingly pain-

ful, the cause usually being inflammation, stone, fo
&c. As in the preceding instance of “irritable blad
employed to denote a specific affection when the t
not been discovered; but the existence of some exc
be predicated as invariable. Spasm is allayed, wha
may be, by general and local anodynes, anæsthetics
modics, as described under the head of treatment for
titis, and stricture, with which conditions it is liable

Perverted sensibility of the neck of the bladder, or ne
are a few cases of severe urinary symptoms met
neither researches during life, nor inspection after
vealed the nature of the affection. It is important
the number of instances admitted to this category in
nishes in direct proportion to the degree of skill in
is brought to bear on obscure cases. Usually the pa
of symptoms greatly resembling those of stone, but
ings fail to detect a stone, or any other deviation fr
state of the organs. The urine is healthy, or at most
ally contains traces of undue action of the mucous m
rors in diet sometimes aggravate the symptoms, som
effect. Change of air and scene often produce an
which unhappily is only temporary. By careful
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regarded, for want of a better, or more certain
examples of “neuralgia” of the neck of the bladde
ment ordinarily directed to improvement of the gen
against periodicity of attack, if such be present, is
cated in such cases. Palliation of severe pain is to
the usual remedies.

Incontinence of urine. An involuntary flow of
bladder may occur under two widely different condi

important to remember in the treatment of diseases of the urinary organs than this, viz. that an *involuntary flow of urine in the adult indicates a distended, not an empty bladder.*

1. *Incontinence in childhood and youth.* This is a common and sometimes a very troublesome infirmity, affecting patients generally under the age of puberty, although occasionally it continues during some years after that period. The single symptom is that, in the middle of the night or towards early morning, the child wets the bed without awaking, and the act may be repeated once or a greater number of times before rising. Sometimes this occurs every night; sometimes there is an interval of one night, rarely of more. The patients so affected do not appear to belong to any particular temperament, nor to be necessarily weak and cachectic. In some the failing is simply a habit resulting from want of management, such as neglecting to take up young children once during the long period which is necessary to them as a night's rest. In such cases careful attention to habits and diet may arrest the infirmity. In many cases, however, no ordinary management succeeds, and medical aid is sought.

Innumerable remedies have been given, and with a very unequal success. Small doses of cantharides and of strychnia, either with or without iron, are sometimes employed. Tincture of iron alone, or the *vinum ferri*, has sometimes proved successful. Blisters to the sacrum has been a favourite remedy; also cold douches to the spine, and general tonic treatment in most cases. In my own experience, nothing has afforded such good results as belladonna. I have employed it in the form of extract, commencing, according to the age of the patient, with the sixteenth to the eighth of a grain twice a day, and increasing the dose if required as far as it can be safely borne. It is necessary to add, that disappointment has arisen in the use of this remedy from the impurity of the drug; it is absolutely necessary to employ a pure extract. After failure with a preparation from one source, I have quickly succeeded with one obtained from another.

In cases of extreme obstinacy, I have succeeded by applying a solution of nitrate of silver, ten grains to the ounce, to the prostatic portions of the urethra and neck of the bladder. This remedy is also easily applicable to the posterior part of the urethra in the female.

In no cases is it desirable to employ mechanical pressure to prevent micturition. Either by some of the agents already named, or by the improvement of the health, in which may be included the removal of worms, and other sources of intestinal irritation always to be looked for in obstinate cases, success may generally be attained sooner or later, although perseverance is occasionally necessary for a long period of time.

2. *Incontinence in the adult*, as has been before shown, indicates, in the vast majority of cases, a bladder distended by retained urine; the cause of which may be stricture, enlarged prostate, cystitis, stone, atony from over-distension, or true paralysis. Very rarely does it happen in the male that the urine runs off from the bladder as fast as it arrives there from the kidneys. Hence it is a cardinal principle in practice, that whenever urine runs off incontinently, a

catheter should be passed to ascertain the amount of retention present, and to relieve it. In the female, true incontinence is more frequent, and is generally caused by a traumatic injury to the short urethra, which has impaired or destroyed the sphincter's action, such as sloughing from pressure in labour, or from the use of instruments to remove the child, from over-distension of the urethra in removing calculus, &c.

In regard to the treatment of incontinence, it is unnecessary to recapitulate that which is appropriate to the various conditions above mentioned as causes of an unnatural flow of urine from the bladder, since they have been considered under their various headings. When that rare affection in the male adult, true incontinence, maintaining the bladder in a constantly empty state, is really present, the cause will be sought either in some perverted action of the nervous centres, or in a certain rare form of prostatic enlargement in which the phenomenon in question does occur. Supposing that there is no local organic disease to be found in the urinary organs, the nervous centres alone can be held responsible for the symptom; a strict investigation of the cerebro-spinal system must be instituted, and some other sign of lesion of that system will probably be discovered, in which case the treatment must consist in that which the general affection indicates, together with the employment of some local appliances suited to protect the patient from the disagreeable results of his infirmity, such as a well-adapted urinal. Where incontinence results, as occasionally happens, from mere functional derangement, caused by debility from excesses, the cure will be effected by any means of a tonic character which can restore normal tone to the spinal system. For this object the preparations of steel and zinc, of strychnia, together with quinine and other vegetable bitters, are of great value. Nutritious diet, cold sea-bathing, and abstinence from the causes of debility previously acting, form also a part of the treatment for these cases. The local alteration of structure, which does occasionally give rise to the incontinence just described, is a form of enlargement of the prostate, in which the posterior portion, commonly called "third lobe," is much hypertrophied, and projects forward in the manner of a wedge between the two lateral lobes, so as to open out the neck of the bladder and render it constantly patent; instead of projectly backwards into the cavity, as almost invariably happens, and forming a species of valve which prevents the outward flow of urine. The former condition permits the bladder to remain constantly empty, and the organ becomes small in capacity. The latter maintains it constantly filled with stagnant urine, unless the catheter be employed to remove it, and produces a dilated and capacious bladder. The treatment of the former condition consists mainly in providing a urinal; nothing in that stage can be done to modify the form or condition of the enlarged prostate, beyond that which is effected in preserving as good a state of the general health as circumstances admit.

Habitual engorgement of bladder, and overflow of urine. These terms more correctly describe the conditions met with in the majority of cases in which urine passes involuntarily, than that of "paralysis," so commonly used, and already referred to at length. Urethral obstruction from enlarged prostate, or stricture, having existed for a certain period of time, the bladder becomes unable to contract with sufficient force or continuance to overcome the obstacle and empty itself; so that a certain portion of the urine always remains after every act of micturition. This failure of the bladder to con-

tract fully, when once established, becomes gradually more marked; the remaining quantity of urine becomes larger; the viscus is habitually engorged with fluid, its coats are thinned, distended, and atonied, its neck is dilated, and as this permits a portion to run off irrespective of the patient's will, brief temporary relief is afforded. This overflow occurs first during sleep, and subsequently from pressure of the abdominal muscles when any efforts inducing their contraction are made. Unless this state of things is remedied by proper treatment, the result is, sooner or later, chronic inflammation of the bladder, with a tendency to spread upwards to the ureters and kidneys.

The treatment of engorgement and overflow consists in emptying the bladder from once to three or four times in the twenty-four hours, according to the necessities of the case, and in using those remedies which the amount of chronic cystitis, almost always present to some extent, indicates to be necessary (see Chronic Cystitis, p. 345).

Retention of urine (see Stricture).

THE PROSTATE.

Malformations. There are no special malformations to be noted here, except such as are involved in the condition called "extroversion of the bladder," which see (p. 339).

Injuries (see vol. ii. p. 498).

Inflammation of the prostate	} acute, chronic.
(<i>prostatitis</i>);	

Abscess of the prostate.

„ periprostatic.

Hypertrophy and simple tumours.

Atrophy.

Malignant disease.

Tubercle.

Cysts.

Acute inflammation of the prostate. This affection rarely exists alone, but is generally associated with inflammation either of the urethra or of the bladder. It may be secondary to cystitis, and often is so; but it more frequently owes its origin to gonorrhoeal inflammation, which has extended unchecked to the prostate, and it may be to the bladder also. Sometimes, however, it happens apparently as a purely idiopathic occurrence, and not by extension through continuity of tissue. This idiopathic inflammation, excepting the cases produced by violence, as by instruments, &c., is probably extremely rare.

Causes. These are : the præexistence of acute inflammation of the urethra from any cause, but especially the gonorrhœal ; stricture of the urethra in an aggravated form, giving rise to inflammation of all the parts posterior to it ; the application to the prostate of strong injections, cauterisation, the passing of sounds, and mechanical violence of various kinds ; inflammation of the bladder, and calculi. Cold and damp to the perineum will give rise to it, perhaps most frequently in gouty and rheumatic subjects. Alcoholic drinks may induce prostatic inflammation, urethritis already existing, but only on this condition. Inordinate sexual excitement, under the last-named circumstances, is also an undoubted cause.

Symptoms. At first, a sensation of weight and fulness about the rectum and perineum is experienced, with some pain and uneasiness at the neck of the bladder. The patient wants to pass water more frequently, and does so with much pain, especially at the close of the act. These symptoms increase ; the pain becomes severe, shooting and throbbing, and almost continuous ; a sense of great tension is experienced, and the anus and perineum are tender when pressed. Pain in the back and loins, and often in the thighs, is complained of. Movements of the body become painful, as does also the sitting position. The act of relieving the bowels at stool produces considerable distress ; and a finger introduced into the rectum encounters opposition ; the anterior wall of the bowel is prominent, hard, and hot, and the outline of the prostate may be traced, much larger than in the natural state. An attack of piles may be induced, the close contiguity of the hæmorrhoidal and prostatic veins favouring this result. Should a catheter be passed, the patient complains of excessive pain when the instrument reaches the prostatic part of the urethra. At a later stage, if suppuration has taken place, the rectal swelling becomes softer. Micturition is often difficult, and may even be impossible, total retention occurring from the obstruction produced by the swollen prostate. General fever accompanies these symptoms, commencing with rigors, and manifesting itself by all the usual signs during the acute stage of the disease. Pus usually appears in the urine after a few days, and if there has been abscess, often in large quantity.

Treatment. In general cases antiphlogistic regimen and diet should be observed. There is seldom reason to bleed from the arm, none to give mercury, except as a purge ; but a little antimony and full doses of alkali should be taken, such as the bicarbonate or acetate of potash. The bowels should be freely opened at the outset, and a gentle action upon them maintained afterwards. Local bleeding usually gives more relief at the outset than anything else. From ten to twenty leeches should be applied to the perineum and around the anus : or a cupping to six or eight ounces may be performed.

Then a hot hip-bath should be taken, followed by a large poultice on the perineum, and the patient be wrapped up warmly in bed. The hip-bath may be repeated with advantage in the course of the treatment, but should not be used for more than ten minutes at a time as a rule. If retention of urine occurs, and does not give way at once to hot fomentations and a full dose of opium, a medium-sized gum elastic catheter should be passed, and the bladder relieved. The instrument may generally be withdrawn at once, and is to be used again if necessary (see Retention of Urine).

In the course of a few days the severe symptoms generally subside, often, however, not without the occurrence of occasional relapses. These are mostly attributable to some indulgence on the part of the patient, either in the use of stimulants, exercise, or erotic excitement. When convalescence is established, the prostate still remains much enlarged and hard, and the stream of urine is not propelled with the natural amount of force.

Chronic inflammation. Sometimes the prostate is enlarged, but not invariably; when occurring as a sequel to the acute attack, perhaps it always is so. The symptoms are: diminished force in propelling the urine; usually also some gleet discharge; the urine is cloudy, and deposits more or less pus on standing, and after passing it, a drop or two of blood may follow. There are weight and dull pain in the perineum and about the anus; pain also in passing water and in sexual intercourse; and sometimes frequent and debilitating nocturnal emissions. The bladder is irritable, and all the symptoms are generally aggravated by much exercise and by errors in diet.

Treatment. One of the best means is continuous counter-irritation of the perineum by nitrate of silver or acetum lyttæ, maintained for some weeks, and the surface dressed with simple ointment. Tonics and good diet, with attention to the digestive organs, are almost always indicated; these latter being in fair condition, iron is mostly beneficial; and as the bowels should in these cases not be constipated, the iron should be combined, when necessary, with some mild laxative. When nocturnal emissions are frequent, and especially if they occur without any consciousness whatever on the part of the patient, the application of a solution of nitrate of silver, from ten to thirty grains to the ounce, to the prostatic part of the urethra, is one of the best means of treatment. To be successful, an efficient instrument is absolutely necessary, as well as care in injecting the fluid at the right spot: three or four applications may be requisite. Let it be remarked, that we are by no means to infer the existence of chronic prostatitis because the patient is subject to frequent seminal emissions. These occur frequently from altogether different causes, which, as they have no necessary connexion with disease of the prostate, need not be further considered here.

When enlargement only remains after acute inflammation, the iodide and the bromide of potassium should be given for a considerable period of time. Conjoined with or following this treatment, a course of tonics, steel and quinine, with sea-bathing and generous diet, often effects a great improvement and completes the cure.

Abscess of prostate. Acute inflammation, when neglected, or occurring in a naturally weak or delicate constitution, may result in suppuration of the organ. This occurrence may be suspected when after the first week or two the acute symptoms do not subside, when the pain and difficulty of micturition and defæcation increase, if rigors occur, and the patient is very restless and feverish, complain-

ing of tension and pulsation in the perineum or neck of the bladder. Fluctuation may be felt per rectum; or pressure in the perineum may reveal tenderness and fulness there. The natural course of abscess in the substance of the prostate is generally evacuation by the urethra. Occasionally it issues by the rectum, and this is perhaps as favourable, generally speaking, as through the urethra. It may be followed by a troublesome urethro-rectal fistula; but this is rare. Generally the opening of the prostatic abscess into the urethra soon closes; but if this does not take place, the cavity may long remain open, and become a receptacle for urine, giving rise to fresh abscesses in the vicinity.

In treating a case presenting the symptoms described, we should watch for any evidence which may exist of matter forming in the perineum; and if so, an incision should be at once made boldly in the median line, so as to evacuate it. If successful, the patient will be greatly benefited; but if no pus is encountered, no harm results, but the relief of pain and of tension is probably effected. Occasionally puncture of the abscess has been accomplished in the rectum when fluctuation has been distinctly felt there.

The discharge of matter from an acute abscess of the prostate is sometimes followed by long-continued suppuration. Chronic abscess may arise here spontaneously, though not very frequently; generally resulting from confirmed or neglected stricture of the urethra. When this has occurred, and the matter has been discharged into the urethra, it sometimes happens that the cavity enlarges, urine makes its way into it, fresh irritation is maintained, and much of the prostate is destroyed; its capsule becoming little more than the sac of a pus-secreting cavity. Sometimes the abscess is limited to one side or lobe only, and sometimes the collections are two or three in number; generally speaking, however, the result found after death is that described. This condition is always one of serious import, and its existence is often not suspected during life. There are present the symptoms of chronic cystitis, emaciation, often hectic; and a highly tonic and soothing regimen is usually indicated. Injections of nitrate of silver, of half or one grain to the ounce, are sometimes useful; but no local interference is desirable which gives much pain, or even temporarily aggravates the symptoms.

Abscesses supposed to be prostatic have not unfrequently turned out to be situated external to the prostate, and not within the envelope of the organ. Such are termed periprostatic. They arise much in the same manner as prostatic abscesses, but are of less serious import than those situated within the capsule of the prostate itself. The treatment requires early incision, and does not differ in other particulars from that already described for prostatic abscess, properly so called.

The organic enlargement of the prostate of advanced age (hypertrophy). This common affection very seldom occurs before sixty years of age; I have never seen or heard of a true example of it before the age of fifty-four years. Chronic inflammatory enlargements may occur at any age after puberty; but the disease now under consideration is wholly distinct, both in nature and by causal relations, from such or any other inflammatory state. It has been said to be the common inheritance of old age, but it is, on the contrary, a complaint which a very large majority of elderly men escape. With the view of ascertaining the relative frequency of its occurrence, so far as such a number of observations can be regarded as indicating it, I dissected out with great care the prostate in forty-three elderly individuals, the results of which inquiry are presented in the following summary: Appreciable enlargement existed at the rate of 32 per cent; notable enlargement, causing symptoms during life, at the rate of 12 per cent. The oldest individuals of the series were among the unaffected; including 1 at ninety, 1 at eighty-five, and 2 at seventy-nine years. Subsequent more extended researches by Dr. Messer and myself have but confirmed these results.

The enlargement consists mainly of an over-development of certain tissues which enter into the normal structure of the organ itself. These tissues consist, first, of unstriated muscular fibre and the connective tissue always associated; and they form at least three-fourths of the prostatic body: secondly, interspersed among this structure are numerous branching glandular tubes and crypts with their accompanying ducts.

Enlargement, or hypertrophy as it is commonly termed, may be determined by an abnormal production of the first-named elements alone, or with some of the glandular tissue interspersed; and this latter may be fully or imperfectly developed. The two lateral lobes of the prostate may in this manner be increased to four or six times their natural weight and bulk; or an outgrowth may take place from the central part of the organ, in a backward direction, towards the cavity of the bladder, as a more or less rounded or pyriform tumour of prostatic tissue, and constituting what is frequently, but not very correctly, called the enlarged "third lobe;" and this form is one of those most commonly met with. Generally, however, every part of the organ partakes more or less in the enlargement.

Again, while the tissues thus described may be generally over-developed throughout the entire prostate, it is very common to find independent, or almost independent, and isolated tumours of the same material embedded within the prostatic structure proper. On

making a section with a sharp knife of a prostate so affected, these small rounded bodies are easily divided, and the portions may be removed by the finger-nail. They are usually made up of very compact tissue, like that of the prostate itself, but generally with less of the glandular element, and that, almost always, presenting a defective development. Sometimes they are completely isolated by a limiting fibrous cyst. The presence of these small tumours is extremely common in the enlarged prostate, as well as in the healthy organ in advanced life, and they seem to bear a relation to the containing organ somewhat similar to that which the uterine fibrous tumours bear to the uterus. In both cases they are composed mainly of unstriped muscular tissue, and exhibit other points of analogy in their nature and history.

The most important result of enlargement is obstruction to the flow of urine. Its first effect on the prostatic urethra is increase, sometimes considerable, of its antero-posterior diameter; there is also diminution of its lateral or transverse diameter, the canal becoming a narrow passage, instead of one which, when distended, is of about equal diameter in every direction. The length of the prostatic urethra is also materially increased, and it is often tortuous also. In some preparations which I have examined, the urethra has measured four inches from the orifice of the bladder to the membranous portion, instead of one inch and a half, which is the normal length.

The natural direction also deviates: where there is enlargement of the median portion or "third lobe," the urethra suddenly rises, producing an angular curvature in the place of a nearly straight line; so that a complete step has sometimes to be surmounted at the neck of the bladder before an instrument will enter the cavity. When, with this development of the median portion, there is much enlargement of either lateral lobe, the lateral direction of the canal is also changed. Thus if the right lobe predominates, there will be a lateral curve of the urethra, the convexity of which is presented to the left, and *vice versa*.

The next deviations are those in the form of the internal meatus, or vesico-urethral orifice. When the median portion predominates, this orifice has a crescentic form, the convexity of which is directed upwards. When the right lobe considerably exceeds in size the left, the crescent has its convexity to the left side; and so on. In some preparations, where two or more irregularly-enlarged lobes are combined, the orifice is much distorted, presenting a tortuous outline. Sometimes it is overlapped by an outgrowth from the median portion in the form of a valve. In this case, which is not common, the

valvular portion appears to be forced against the neck of the bladder by the effort of micturition, and the obstruction rendered still more complete.

The size and weight attained by hypertrophied prostates are sometimes remarkable. A prostate measuring two inches in a transverse direction, and one inch in thickness from before backwards, or which weighs an ounce, must be considered hypertrophied. On the other hand, a transverse measurement of three inches is not uncommon. I have seen one exceeding four inches and a quarter; but such a degree of enlargement is extremely rare. The weight has been known to reach twelve ounces. In malignant disease even these limits are exceeded.

The consistence of the organ varies, being sometimes firmer and harder in texture, at others a little looser and softer than in the natural condition. It usually presents the former character when numerous fibrous tumours are embedded in its substance.

Symptoms. In the earliest stage of chronic enlargement of the prostate there is nothing to attract the attention of the patient, as it is probable that a considerable period is passed between the actual commencement of enlargement, and the occurrence of any marked symptom. One of the earliest signs generally observable is diminution in the force with which the urine is ejected, and the lapse of time which occurs before a stream is established. The size of this is not necessarily much smaller than it was in health, but it cannot be projected so far by the ordinary amount of effort. The desire to pass water becomes more frequent than natural, and the relief afforded by the act of micturition is less complete. On rising in the morning, when the bladder has become distended during sleep, the want occurs again in a few minutes, especially after the first effort; and in course of time sleep is much disturbed by calls to pass water. A sense of weight, fulness, and uneasiness about the perineum and rectum is felt, which the patient soon refers to the neck of the bladder. As the expulsive efforts to pass water become more frequent, irritation of the rectum increases, the contents of the bowel are more frequently passed from inability on the part of the patient to prevent the act of defæcation accompanying that of micturition; and tenesmus, protrusion of the mucous membrane or prolapsus, and hæmorrhoidal swellings, are apt to result. Much stress has been laid by some writers, following J. L. Petit, on the appearance of flattened stools as an indication of enlarged prostate, but certainly without sufficient grounds. In some cases the motions may be passed in the form described; but this is caused by the action of the

sphincter ani, and not by the prostate. If the complaint advances unchecked, the symptoms of chronic cystitis appear, and pains also sometimes in the penis and testicles. Occasionally, some mucous-purulent discharge from the urethra is observed; this varies with circumstances, sometimes appearing after exposure to cold or damp, or with an attack of retention; while it may happen also that the irritation involves the testicles, which become tender and swollen. Vascular excitement of the penis, producing frequent erections, is also at times a concomitant symptom. As the complaint makes progress, relief to the bladder in micturition becomes less complete, since the enlargement gradually closes the neck or urethro-vesical outlet, and the bladder is never emptied, a certain portion of its contents only being expelled at each act of micturition. These difficulties, if unrelieved, inevitably increase; the capacity of the bladder yielding to the constantly-augmenting pressure upon it. Hence in time the organ remains habitually filled, and the surplus only flows off at each act of micturition. At night, when voluntary control is suspended by sleep, urine drains away, to the great discomfort of the patient. This condition is generally described as "incontinence;" a misapplication of the term, which has been productive of fatal errors in practice. A much better term is that of "overflow;" and this I shall for the future employ, as aptly indicating a condition which, so far from being one in which the bladder *cannot retain*, is one in which it *retains too much*. A sign which should be looked for in such cases is the existence of dulness on percussion above the pubes, and the degree, if present, to which it extends; it is sometimes found as high as the umbilicus, although more frequently to the extent of only three or four fingers' breadth above the pubes.

As the complaint advances, the patient's health deteriorates, and he is the subject of frequent febrile disturbances; while slight irregularities, or exposure to adverse circumstances, produce extreme distress from the severity of the symptoms occasioned. Attacks of complete retention are impending on these occasions, and the functions of the kidneys become impaired through the long-continued impediment to the discharge of their secretion. A little hæmorrhage is not uncommon, and sometimes relieves congestion: it may occur after exposure to cold, sexual excitement, or other circumstances which tend to produce a vascular determination to the pelvic viscera.

The characters presented by the urine are such as depend on decomposition of some of its constituents from abnormal reten-

tion, mixed with the products of chronic inflammation of the bladder. More or less of mucous deposit slowly falls to the lower part of the vessel, and a thin pellicle forms on the surface, which is sometimes iridescent. In later stages the mucus increases in quantity, and appears as the glairy, tenacious, slimy, adhesive matter so well known to be associated with chronic inflammation of the bladder. This sometimes exhibits traces of phosphatic matter, in masses of soft consistence and whitish colour. When the mucus has subsided, there is sometimes deposited upon it an opaque creamy-looking layer of pus mixed with crystals of the triple phosphate in varying quantity. In any stage of the complaint, the urine may be darkened in colour from admixture with blood.

The chemical reaction of the secretion is at first neutral, then alkaline in various degrees of intensity. The odour is pungent, ammoniacal, often foetid, sometimes extremely so. These characters are influenced to some extent by the quantity passed, which often varies considerably in the same patient from day to day; the measure being sometimes below, but more generally much above, the natural or healthy standard.

As a result of long-continued disorder in the urinary apparatus, and of the changes in the urine itself, which have been thus described, it is not surprising that the formation of calculus sometimes takes place. Its presence will be suspected if sudden impediment is frequently experienced to the stream of urine; if there is much pain about the neck of the bladder at or following the act of passing it; if the pain at the end of the penis is unusually severe, and if the blood and pus are very frequently observed, and especially if fragments of calculous matter have from time to time been passed. But the existence of calculus is sometimes masked by the prostatic disease, because the conformation which the neck of the bladder assumes in this affection tends to prevent the most distinctive symptoms of stone; inasmuch as the foreign body is less liable to be engaged in the vesical neck, but lies back deeply behind the enlarged prostate.

It not unfrequently happens that symptoms of enlargement exist long before the real cause is suspected: the frequency of micturition suggesting that there is undue freedom rather than obstruction to the act. The real malady is masked, and the treatment is directed only to those symptoms which have been productive of most discomfort or anxiety to the patient; to some febrile condition, it may be, resulting from the hidden cause. The march of events, however, must ultimately throw suspicion on the state of the blad-

der; a catheter is passed, and, greatly to the astonishment of the patient, some thirty or forty ounces of urine, or even a much larger quantity, may be drawn off, notwithstanding that the act of micturition has been just performed. And it occasionally happens, during the prevalence of such a state, that some unaccustomed error in diet, or exposure to cold and damp, suddenly produces congestion of the prostate, and complete retention, and so discovers the existence of the affection for the first time.

The last stage of unrelieved disease is indicated more by the signs of a gradual decline of the powers of life than by those of advancing obstruction; although sometimes the final symptoms are those of rapid depression, after sloughing or ulceration of the bladder, and repeated hæmorrhage, or from great discharge of pus from its cavity; rarely there is uræmic poisoning from failure of the eliminating function of the kidney.

Diagnosis. The test which is chiefly depended on by the Surgeon is digital examination by the rectum. For this purpose, the patient should lie on his back upon a couch, the Surgeon standing on the left-hand side, so that the fore-finger of his own left hand may be employed in the rectum, while the right hand is free to use a catheter if required, since by concerted movements of that instrument in the urethra, and of the finger in the rectum, more accurate information may sometimes be obtained than by either exploration conducted separately. The patient's knees being drawn up and separated a little from each other, the finger should be made to glide slowly through the sphincter, and when introduced as far as possible, so that two phalanges are free to move in the bowel, the limits of the prostate may be defined.

If familiar with the normal conditions of the organ, its deviations will easily be recognised by a methodical examination. We may first observe its size and form; thus, respecting enlargement, is it general or partial? affecting one or both lobes? and to what extent? It is so prominent sometimes that the tip of the finger encounters the swelling the moment it enters the rectum, and has to be depressed very considerably before it can be carried beneath the tumid organ. Instead of finding the yielding coats of the bladder in the middle line, when the finger is carried up to its fullest extent, an increasing fullness and firmness may be encountered, due to an enlargement or outgrowth from the median portion. The form of the enlargement may not be uniform but irregular in outline.

Next, we observe whether the tumour is soft, hard, or unequally

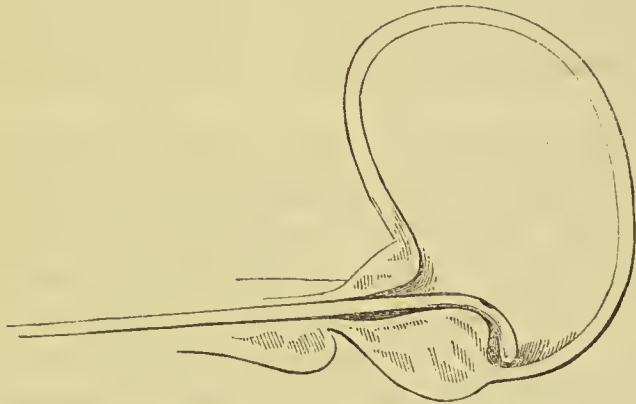
so in places; whether there is fluid in it; and whether we can appreciate fluctuation distinctly beyond it; an important consideration in a case of retention which may require the trocar. We observe also the degree and locality of tenderness on pressure. If inflammation is present, the pain will be extreme, and the mere introduction of the finger will be very distressing to the patient; in this case, heat and tension will be remarked also.

Lastly, supposing the catheter to have been previously introduced, we may, while holding it in the right hand, and communicating to it gentle movements downwards, gain an approximative idea as to the thickness of the tissue which intervenes between it and the finger in the bowel, and as to the situation and direction of the instrument, &c., in the event of there being difficulty in introducing it.

Having learned relative to these different points all that can be attained through the rectum, the urethra is to be explored. A full-sized catheter, of the form ordinarily employed by the Surgeon, should be first used, because any phenomena presented differing from those observed when the prostate is healthy are then at once made apparent. If by examination through the bowel no variation is found in regard of size, and the urine flows when the catheter has traversed not more than the ordinary distance, say from six and a half to eight inches, while the handle of the instrument itself has not required more than the ordinary amount of depression in order that its point may enter the bladder, we may be satisfied that prostatic enlargement does not exist; and we must seek for another cause of the symptoms complained of. But if the catheter has passed easily, say for nine or ten inches, and still no urine flows; and if, in addition, while following its course, the handle has become more than usually depressed, there will be little doubt in respect of the existence of prostatic enlargement. The ordinary catheter being inadequate to reach the bladder, a prostatic catheter, which measures from two to four inches longer, and possesses a larger curve than the ordinary catheter, may be employed. If it passes readily, the increased length of the urethra is easily ascertained, and the direction of the prostatic canal is calculated from the position of the shaft when the point enters the bladder. In some few cases, while the beak passes through the prostatic part of the urethra, the handle will be distinctly deflected to the right or left, from which fact, if verified by two or three trials, a greater degree of enlargement may be suspected to exist on the side *towards* which the handle turns.

For the purposes of accurate diagnosis, we shall employ with advantage an instrument of a different form, viz. an exploring sound with a very short curve at its extremity, or possessing a beak rather than a curve, which is shorter and more angular than that of the ordinary catheter. By its means not only can every part of the bladder be searched for calculus, but information respecting the form and degree of obstruction at its neck can also be acquired: see fig. 1. After the bladder has been traversed, the instrument should be gently withdrawn until the beak lies just

Fig. 1.*.



within the urethro-vesical orifice, when, by turning it round to the right and left, the natural condition, if it exist, of that part can be ascertained; or, on the other hand, the presence of tumour or of stone, the depth of the fossa behind the prostate, and other relative points, can be determined. A light, delicate, and practised hand is necessary in its use.

This portion of the subject may be appropriately closed with a few remarks on the diagnosis of prostatic enlargement from stricture of the urethra, vesical calculus, tumour of the bladder, simple atony or inertia of the coats of the bladder, and paralysis.

In stricture of the urethra, the stream of urine is invariably small, in a confirmed case extremely so; in the prostatic affection, though diminished in force, it is much less so in volume than in the previous case. The use of a full-sized sound, however, marks the distinction clearly. In stricture, obstruction is encountered almost invariably before six inches of the instrument have disappeared, always before it arrives at the prostatic urethra. In enlarged prostate, obstruction is not encountered until seven, eight, or nine inches

* The exploring sound, with short angular beak, for defining tumour, or discovering calculus: in this case represented in a bladder with enlarged prostate.

have passed, and not necessarily then, for, provided that the instrument be sufficiently long, it may pass into the bladder; but the handle has to be depressed between the patient's legs in a manner not required in the normal state. Lastly, stricture almost invariably makes its appearance before middle life, prostatic hypertrophy not until that period is passed.

In regard of calculus, while many of the symptoms are common to both complaints, the occurrence of sudden cessation of the stream of urine, of severe pain at the close of micturition, the exacerbation of symptoms, especially of pain, and the appearance of a little blood after exercise, may be looked upon as strongly indicating the presence of stone in the bladder. But it may exist in the absence of most of these symptoms, the two first-named especially, from the circumstance that the calculus is usually situated behind the enlarged prostate, and does not approach the more sensitive region of the internal meatus. The fact of small quantities of florid and unmixed blood being occasionally passed after exercise, more closely approaches in value to a pathognomonic sign than any other. A persistent discharge of muco-pus streaked with blood should arouse suspicion. The use of the sound, however, can alone clear up the case satisfactorily.

The existence of non-prostatic tumour of the bladder is less easily affirmed. Compared with prostatic enlargement, there is much more pain in the introduction of instruments, the urine is frequently or generally mingled with sanious discharge and flocculi, to which sabulous matter is often seen adhering. Examination of these under the microscope may reveal the peculiar structure of villous growth; or may demonstrate that these flocculent matters consist of organised structures, not of inorganic materials, a fact possessing some significance.

Simple uncomplicated chronic cystitis, with catarrh, is by no means a common affection. Such symptoms are almost invariably due to the presence of a foreign body, to some form of obstruction, or to paralysis, or atony, depriving the patient of the power of expelling the contents of his bladder, a condition which is tantamount to obstruction. We may rely upon it, that in most of the obscure cases there is a material cause, frequently calculus; the presence of which needs a more than ordinarily searching examination to verify.

Single or repeated acts of voluntary over-retention of urine are sometimes followed by atony or inertia of the muscular parietes of the bladder, and a state of chronic retention follows from their

consequent inability to expel the vesical contents. The condition resulting resembles much the retention produced by enlarged prostate, and requires frequent relief by the catheter in the same way, at least for a time. Here the absence of physical signs, the suddenness of the attack, its connexion with a cause generally recognised by the patient, and the diminished power of discharging the urine *after a catheter has been placed in the bladder*, especially when he is recumbent, are sufficient to distinguish this affection. Particular attention should be paid to the last-named point. In enlarged prostate, the urine often flows with considerable force when the influence of the obstruction is removed by the introduction of a catheter, and the current can be accelerated materially by the will of the patient, unless there be atony also, as there may be from undue distention; the atony, however, is not generally considerable, except in long-neglected cases. But when the cause of retained urine is not obstruction, but atony of the bladder, the urine barely flows from the catheter, and is not propelled, nor is it much influenced by any efforts of the patient.

Lastly, there is paralysis of the bladder; a condition in which its nervous supply is either impaired or destroyed. It is almost always associated with a similar condition of the lower extremities, and this may result either from disease or injury of the encephalon or spinal cord. There can be, therefore, little doubt respecting its presence; and when it does exist, the indication which catheterism presents is characteristic. An instrument being introduced, the urine is propelled by the weight of the parts around, the will of the patient exerting no influence upon its flow unless the abdominal muscles should be in a normal condition, as in cases of injury (rare) occurring to the spinal cord between the sources of nervous supply to those muscles and to the bladder, in which case a slight influence is perceptible. Otherwise no impulse is noticeable, except through the agency of acts unassociated with micturition; such as deep inspiration, coughing, sneezing, and the like, by which a momentary pressure is communicated to the paralysed bladder, and the stream is temporarily accelerated.

Treatment may be regarded under three heads.

1. Treatment for the purpose of obviating the results of obstruction caused by hypertrophied prostate.

The fact being discovered that a certain quantity of urine is habitually retained in the bladder, however frequently or forcibly the efforts to evacuate it have been made, the first thing is to insure the complete removal of the urine from the viscus at least once a day. It may be very desirable to do this twice, or even three or more times, daily, the necessity depending upon the degree of obstruction, and the consequent amount of residual urine. And

if the power of urinating is almost or quite lost, it will be necessary to employ the catheter as often as a decided want to micturate is felt. There are certain modifying circumstances which must be taken into account; such as the facilities which exist for passing instruments, and the condition of the urethra itself. If the patient possesses the ability to pass a catheter easily for himself,—and it is very rare that he cannot attain it by tuition and practice,—he complies with the demands of his case. He should be made to understand that, having his own sensations to guide him, he may soon attain considerable dexterity in the management of an instrument in his own urethra. But if this be in an extremely irritable state, which is aggravated by the frequent use of the catheter, however carefully it may be introduced, it is necessary to consider carefully the relative necessities of the urethra and the bladder, and some compromise must be made between them. In most cases, the removal of the urine night and morning suffices to maintain the reservoir in a tolerably sound and healthy condition, and it is extremely undesirable to resort to artificial aid with greater frequency than is absolutely necessary to accomplish this. For the use of the patient himself, and generally for the Surgeon, flexible instruments are, in the majority of cases, the better and safer kind.

When the necessity for a catheter is very frequent, some have advocated the plan of permitting a catheter to remain in the bladder for days together. As a rule, this is not desirable, since irritation and even ulceration may be soon produced by the instrument. Where, however, great frequency in making water exists, and ease and sleep are found to be promoted by the plan, it should be adopted for twelve hours or so at a time; as during the night, for example. In this manner it may be extremely useful. But in circumstances of urinary retention, which has been relieved with difficulty by the catheter, we may be justified in permitting the catheter to remain in the canal for a considerable period.

The consequences of enlarged prostate already alluded to, viz. the increasing retention of urine and habitual distention of the bladder, which accrue from not completely emptying it daily, form only a portion, although a very important one, of the evils which can be obviated by the habitual use of the catheter. It is impossible to overrate the benefits arising to the patient from its use; and the responsibility which is incurred by overlooking it should be ever present to the Surgeon's mind in dealing with any signs of irritability of bladder, and incompetence to retain perfectly the urine by patients in advanced years.

In relation to the treatment of chronic cystitis, catarrh, &c. arising as they so frequently do in connexion with hypertrophied prostate, see the sections thus headed, pp. 343-8.

2. The general treatment of enlarged prostate.

It is of great importance to maintain all the functions of the body in healthy action, in treating patients who thus suffer. Slight derangements in other parts of the system are very prone to augment the urinary symptoms. A simple catarrh, a fit of indigestion, or unrelieved constipation, are very apt to produce increased obstruction or greater irritability of the bladder.

All that tends to derange the stomach and bowels, to tax unduly the digestive powers, or to over-excite the circulation, must be avoided.

The clothing and the habits should be such as encourage and maintain a due action of the skin. Damp must be sedulously avoided, or removed after exposure, especially from the feet, without delay: the lower limbs should be kept habitually dry and warm; a habit of the first importance, as freedom of circulation and healthy vascular action here is one safeguard against the recurrence of congestion in the organ.

The question of exercise is one of importance. The subject of enlarged prostate must not be encouraged to believe himself too much an invalid, but must exert his physical powers, as far as they exist, in daily exercise in the open air, of which walking is the best form. Riding is generally out of the question; the movement of trotting is undoubtedly prejudicial, and bleeding

is often caused both by it and by a long drive over rough roads, or, indeed, after a long railway journey; and, at the same time, increased difficulty in micturition. To assist in producing a healthy and natural state of mind, occupation of a cheerful character, suited to engross the thoughts and energies of the patient, should be found, if possible.

3. Special treatment of the hypertrophy itself.

Although many agents have been administered for the purpose, all medical treatment has been hitherto marked by inefficiency, as to any power exhibited in effecting a reduction in the size of the enlarged organ. Hemlock, mercury, and hydrochlorate of ammonia have all been largely tried, and a certain utility has been claimed for them; but it must be confessed that there exists very little ground for regarding them as efficacious against senile hypertrophy. Iodine, however, at one time seemed to promise more success. It was formerly much employed by Mr. Stafford, who reported results of much greater value than others have since been able to obtain.

His plan consisted in administering it by suppositories in the rectum, occasionally by the mouth, and in applying it to the urethral surface of the prostate in the form of a weak ointment; commencing with one grain of the iodide of potassium to the drachm of simple cerate, and increasing it to ten or twenty grains to the drachm, sometimes even adding to this a small quantity of the pure iodine.

Regarding this as one of the most powerful and useful agents in the *materia medica*, in accomplishing the removal of enlargement when affecting various glandular organs of the body, it was natural to infer, or at all events to hope, that the hypertrophied prostate might also be favourably acted on by some preparation, either of iodine or of bromine. Their influence over simple enlargements of the uterus is undoubted, and a certain analogy between prostatic and uterine enlargements has already been pointed out. The highly-charged iodine and bromine springs of Kreuznach in Rhenish Germany have obtained a deserved celebrity in uterine cases; and Dr. Prieger, the well-known physician there, has assured me, that in the treatment of the chronic enlargement of the prostate of age also he had seen some valuable results from the employment of the waters by bathing and clysters.

But then it must not be forgotten that the embedded or isolated tumour of the prostate, like that of the uterus, cannot be regarded as much amenable to this treatment. That general hypertrophy may be thus influenced, it is not unreasonable to suppose; and it is worth while to try it, if the tumour is an example of that kind. If the patient enjoys a fair share of health, there is nothing to contraindicate it; the treatment may be pursued without exhausting the constitution, or deranging the digestive functions.

From three up to ten grains of the bromide with, at most, one of the iodide, twice a day, is the quantity which it is best to employ. It is scarcely necessary to say that this course must be persevered in for a considerable time, during which the dose may be gradually increased. Suppositories containing the same ingredients may be administered. As to their local application to the urethra, I can only disapprove of it strongly, as certainly producing much irritation, and being most unlikely to effect any benefit.

Now, although we may by perseverance in this line of treatment, and by an appropriate regimen, attain some improvement in the condition of the prostate, or perhaps be able to retard its increase, I think there is no ground for expecting to reduce the bulk of a considerably-enlarged prostate of long standing by any known means.

The influence of compression in retarding the progress of morbid growths and enlargements has been long recognised; attempts have therefore been made to extend its influence to the prostate.

Physick, the American Surgeon, first, afterwards Leroy d'Etiolles, Mercier, and others, have invented various appliances for effecting this purpose. Dilatation by water in expanding india-rubber tubes has been employed by myself. I cannot say, however, that any material benefit is often to be anticipated by any of these means. Great care must be taken to avoid causing

irritation; and if any degree of inflammation of the neck of the bladder or prostate is set up, it is almost unnecessary to say, that more harm than good will probably be produced by the interference.

Division of the obstructing portion at the neck of the bladder has been performed. Other operations have been also attempted for effecting a similar purpose, such as the excision or the crushing of a protruding portion; and even the ligaturing of a polypoid outgrowth. Respecting the division of an obstruction, bar-like in its form, elevated from the posterior border of the neck of the bladder, it is no doubt a proceeding to be accomplished without much difficulty, with the exercise of ordinary care. In most cases, although not invariably, the bar is a prostatic development, and when well marked may perhaps, in some cases, be incised with advantage, and without danger to the patient. Such was the opinion of the late Mr. Guthrie. I cannot say, however, that I have yet seen a case in which it has appeared at all advisable to practise such an operation. So much can be done by management, by maintaining the bladder in a healthy condition by means of the catheter, that the case must be rare indeed in which such an operative procedure is indicated.

In estimating these proposals, most English Surgeons will be content with awaiting further experiences in the hands of those who have hitherto seen fit to adopt them. We can cherish little hope that any benefit will be conferred on the patient by such methods of accomplishing the ends proposed, even granting that no doubt existed as to the possibility of carrying them into execution.

Atrophy of the prostate. The prostate is sometimes atrophied in old age, and occasionally it is so under certain circumstances in early adult life. It is but slightly developed in some malformations, and in constitutions in which the male sexual character is not strongly marked.

The normal weight being about four and a half drachms, it is occasionally found as low as two and a quarter, and not infrequently at three drachms, at ages between 60 and 80 years.

There are no special symptoms of atrophied prostate, nor is any special treatment indicated for patients who are the subject of it.

Malignant disease of the prostate. Malignant disease of the prostate is a rare affection; but it is probable that a few cases are lost sight of among the very large number assigned to senile hypertrophy. The course of malignant disease, when well marked, it is impossible, with ordinary care, not to diagnose from the last-named affection; but in those cases in which a malignant growth arises in a prostate previously the subject of senile enlargement, the cancerous character is sometimes overlooked.

Judging from the data at present existing, the prostate appears to be less commonly the seat of secondary than of primary deposit; the latter only will be treated of here, unless the contrary is indicated.

Malignant disease of the prostate is almost invariably encephaloid. After a close examination of all the cases reported, I adhere

to the opinion expressed by Dr. Walshe in 1846, and resulting at that time from an examination of fewer facts than we now possess, viz. that "the evidence of the occurrence of true scirrhus of the prostate is defective."

Melanotic deposit is said to be occasionally found associated with encephaloid of the prostate. Its presence is reported in two cases; one at adult age, the other in childhood. It is not to be forgotten that interstitially-effused blood in a fungous growth may be mistaken for true melanotic deposit, which to the naked eye it sometimes resembles.

Malignant disease has at present been observed only in childhood and at advancing age. No authenticated cases are on record between the ages of eight and forty-one. The duration of the disease, from the first appearance of symptoms to the fatal result, appears to vary from one and a half to five years in adults, and from three to nine months in children.

The symptoms of the malignant affection are those common to prostatic obstruction of any form, but generally declaring themselves with greater rapidity than in the cases of senile hypertrophy. Besides them, there are other and distinctive characters, such as more severe pain, often very intense; occasional, often frequent, hæmorrhages; and more or less constitutional cachexia. The pain is felt in the rectum, or in the region of the sacrum, and shooting down the thighs, either the anterior or posterior aspect.

Hæmorrhage is a common occurrence both at an early and late period in the course of the disease, always appearing at one time or another, sometimes to an alarming extent. The blood is usually voided almost pure or unmixed, and frequently after some attempt to urinate, which has been attended with greater exertion than usual. Less commonly is the hæmorrhage continuous for some time, as happens in villous tumour, for example.

The enlargement formed by the prostate itself, when examined by the rectum, is hard at first, and may or may not be irregular in outline or consistence. Softening may in the later stages be felt, but the patient's powers do not always sustain him to so late a period as that in which the growth either softens or fungates. Consequently, on examination after death, the prostate may be simply enlarged; or there may be breach of surface and protrusion of soft granulations; or there may be loss of substance and a cavity, the last-named circumstance appearing to be rare. Frequently other organs are affected, but by no means invariably. But there are always diseased lymphatic glands adjacent, and sometimes the infection

reaches more distant groups. The existence of such swellings in the course of the iliac vessels, and sometimes in the inguinal region, may frequently be verified by examination of the abdomen, and constitutes a valuable sign in relation to diagnosis.

The urine may be closely examined, in cases of a doubtful nature, for the presence of cells which may be regarded as malignant from inspection of their forms and constitution. Some observers state that they have verified cancer-cells in the urine. A good deal of débris is seen in advanced cases, its presence indicating that the growth has fungated, and throws off portions of its tissue. I have searched for characteristic forms of cancer-cell in the urine of malignant disease of the bladder, but unsuccessfully, and am not disposed to think that much reliance can be placed upon the appearance of the cells met with. The urinary passages yield epithelium cells of all forms and sizes abundantly, and these, I suspect, have been mistaken sometimes for the so-called "cancer-cell."

Regarding the general treatment of malignant disease of the prostate, nothing more can be suggested than applies to the complaint when occurring in any other part of the body. The treatment is palliative, and must be regulated according to the necessities which arise in the progress of the case.

Thus, accumulation of urine must be provided against at the smallest possible risk of irritating, much less of injuring, the part. If catheterism can be dispensed with altogether, so much the better. In no circumstances is it of more importance to be extremely gentle in the manipulation of instruments. The pain must be relieved by anodynes administered both by mouth and rectum. The addition of opium to opium, by enema or suppository, is often useful; and by the mouth belladonna is sometimes a valuable auxiliary in mitigating pain, given in doses of from one-fourth to three-fourths of a grain twice or three times a day. Hæmorrhage must be treated on principles already illustrated (p. 336). The powers of life are to be supported by every means in our power. Nutritious food, both in the solid and fluid form, with a due proportion of alcoholic stimulant, must be supplied in accordance with the wants of the patient.

Tubercle of the prostate. The prostate is very rarely the seat of tubercular deposit, and when it is so, appears generally to be somewhat increased in size, until the later stages of the complaint are reached, when, after suppuration and discharge, its volume may become smaller than natural.

At no period of the disease is the prostate affected alone, some other part of the genito-urinary tract being the primary seat of the affection. In most cases the deposit takes place first in the kidney; the organ next commonly affected, among the genito-urinary group, is the testicle. In fourteen cases collected by myself, tuberculosis of the kidney occurred in eleven, and of the testicle in six: in seven of these cases the lungs are stated to have

been diseased, they were probably so in nearly all. It is difficult to isolate any special symptoms indicative of this affection. Undue frequency and pain in making water, occasionally blood in the urine, and at times signs of cystitis, are commonly experienced. The presence of pus in the urine, of occasional hæmaturia, of pains in the loins, perineum, and penis, give rise to suspicions of calculus, to be resolved sometimes only by a careful search; no foreign body being found, the nutrition of the patient, his history, and the condition of the lungs and other viscera, will probably lead to a correct diagnosis.

Nothing need be said of the constitutional treatment of tubercular disease, and little in relation to the local manifestation in the prostate. Mechanical interference is to be avoided, and every kind of irritating application. If suppuration takes the form of external abscess, it must be treated as other perineal or ischio-rectal abscesses. But more commonly the discharge of purulent and tubercular matter takes place into the urethra. The improvement of the health, by all those numerous means which regulation of the diet, regimen, exercise, climate, and medicine enable us commonly to achieve in tubercular patients, constitutes almost the whole of the treatment to be employed in the affection, when involving the urinary or genital organs. The diagnosis once established, it is of great importance that the patient should be kept free from all instrumental treatment, which, in such cases, provokes irritation, and aggravates the disease, without conferring upon him any benefit whatever.

Cysts of the prostate. It is not at all uncommon, in making sections of an enlarged prostate, to find cavities, of an irregular form, in its substance, not met with in the normal organ. These cavities have all the appearance of being dilated follicles of the glandular structure. Ducts are easily traced into them; and frequently numerous little dark concretions lie free within. I have seen from thirty to fifty of these minute bodies occupying a cavity about the size of a grain of wheat or of a small pea.

But larger concretions, that is, of the size of pearl-barley, small prostatic calculi, may occupy each a separate recess of its own; and on removing the foreign body, a spheroidal, thin, and smooth-walled cavity is displayed. Sometimes hundreds of such small cavities may be found in one prostate; but this is a very rare circumstance.

The formation of these cavities, or cysts as they have been called, depends a good deal on the prior formation of concretions. At all events, the two occurrences are closely associated. We know too little of either the one or the other to affirm any thing very confidently respecting the precise mode of their formation. Most probably the cavities are nothing more than enlarged follicles, dilated caecal terminations of the glandular tubes. There are no isolated

cysts in the prostate filled with fluid, having no communication with the secreting structures around, as in the kidney; no formation, indeed, which can be regarded as analogous to that, which may be considered as the type of simple fluid cysts. Although, in conformity with the practice of other authors, I have referred to "cystic disease" of the prostate, the use of the term is scarcely warranted by the phenomena presented; and if retained, it must be held to signify a formation of a wholly different kind from that which is indicated by it in the breast or kidney.

The cavities referred to do not attain a sufficient size, nor, as far as we know, do they give rise to any symptom whatever to render a knowledge of their presence possible during life. Generally speaking, they are capable of holding not more than a few minims of fluid. In relation to practice, the diagnosis is unimportant, as no indication for treatment would be presented by the fact of their existence, were it ascertained.

The prostate is, after long-continued suppuration, sometimes converted into a kind of cyst or membranous bag; this condition can in no respect be regarded as a form of cystic disease. The organ has, in fact, disappeared, and its capsule forms part of the sac of an abscess which has replaced the normal structures.

It is doubtful if hydatid cysts have ever been met with in the prostate. Cases are on record in which retention of urine and distension of the bladder occurred as a result of a hydatid cyst *between the bladder and rectum*, near to the neck of the former; but in which the prostate was not affected except by pressure. Prostatic enlargement was very closely simulated certainly in some of them, and in two the prostatic catheter was employed under the belief of its existence. Among these cases, one or two have at times been regarded as offering examples of hydatids formed in the prostate itself. But I think evidence is wanting to show that they were so.

THE MALE URETHRA.

Congenital malformations.

Injuries.

Inflammation.

Stricture of the urethra { organic.
spasmodic.
inflammatory.

Tumours of the urethra.

Urinary abscess, acute and chronic.

Urinary fistulæ.

Retention of urine.

Extravasation of urine.

Rupture of bladder (from retention of urine).

THE URETHRA.

Congenital aberrations and malformations. 1. Absence of the urethra is occasionally met with, as in cases of extroversion of the bladder, in which there is neither any cavity nor reservoir to contain the urine, nor any canal to carry it off; but a mucous membrane, corresponding with the posterior surface of the bladder and with the floor of the urethra, alone remains. For further description, see "Malformations of the bladder," p. 339.

2. The canal is sometimes occluded, and this produces retention of urine, and death during the early hours of life. The obstruction may consist merely of a membrane forming a diaphragm across the canal, or of an obliteration of some lines in length, and it may occupy any portion of the tract, but is usually found near the vesical orifice.

3. Deficiency of a portion of the urethra near the anterior orifice is the most common deformity. When a part of the upper covering is deficient, and the mucous membrane of the lower part, or floor, is exposed, the condition is termed *epispadias*; when the contrary condition is presented, the deficiency being that of the floor, the term *hypospadias* is applied to denote it. The degree of deficiency varies considerably, from a quarter of an inch to an inch and a half may be absent in either case. Occasionally, and this is only a variety of hypospadias, a second meatus exists, usually about an inch behind the normal one, opening externally through the floor of the urethra. But the opening may be much further back, and may even render impracticable the ejection of semen into the vagina.

4. Besides these, slight exaggerations in the size or form of the natural parts may be occasionally noted; as of the lacuna magna, the sinus of the bulb, and the sinus of the verumontanum. Not very unfrequently there is congenital narrowing of the external meatus, or of some portion of the passage situated within an inch of it.

Treatment. The simple diaphragm may be perforated by a trocar, or point of a bistoury, when its existence has been clearly ascertained. The congenital narrowing of the external meatus may be dealt with as stricture in that situation. None of the other conditions, with one exception, are improved by the various procedures, by paring and suture, which have from time to time been practised, nor are they sufficiently important to be so treated. But hypospadias existing or extending far back, so as to produce a practical impotency, should not, under some circumstances, be refused the possibility of remedy by surgical operation. This has been accomplished by a combination, of perforating the anterior portion of the penis, paring the edges of the opened urethra, and uniting by suture. Much care and skill, however, are necessary to give the patient any chance of a cure.

Injuries of the urethra. (See vol. ii. pp. 489 et seq.)

Inflammation of the urethra. (See the essay on GONORRHOEA.)

Stricture of the urethra. The term stricture implies an unnatural contraction of the urethral canal, congenital or acquired. Contraction may occur in two forms : it is the nature of the first to be permanent, and of the second to be transitory only, as regards its duration. A permanent contraction is due to organic deposit in or around the walls of the urethra, and is accordingly termed organic or permanent stricture. A transitory contraction may be due either to local vascular inflammation or congestion, causing temporary narrowing of some part of the urethra, hence the term inflammatory or congestive stricture ; or to unwonted muscular action alone, of the voluntary or of the involuntary fibres, in which case it is designated spasmodic stricture. This last-named condition, that of spasm, *may* exist alone, but is usually found as a complication of the other kinds. The term spasmodic is understood to include only cases in which involuntary contraction of the muscular fibres constitutes the main source of obstruction. So also the term inflammatory stricture can only be employed when the diminished calibre of the urethra is mainly due to an attack of inflammation.

Inflammatory and spasmodic strictures have been much confounded ; either may become a cause of the other, and they frequently coexist ; still the distinction between the two is very complete. Examples of pure spasmodic stricture are very rare ; but the influence of muscular action upon the urethra being unquestionable, it is important to recognise it in diseased conditions of the organ, since it usually complicates most of them. Indeed, neither organic nor inflammatory narrowing of the urethra can be well imagined to occur without the coexistence, at some time or another, of some undue action of the muscular tissues around.

Leaving these affections for the present, I shall treat first of organic or permanent strictures, which are susceptible of more accurate and satisfactory demonstration as to their nature and action, and are far more important in relation to treatment and results.

Anatomical classification. Permanent or organic strictures present themselves in a variety of forms. For anatomical purposes all these may be arranged in four groups, by which means it is easy to designate any specimen, according to the physical characters of the stricture itself. It will then be only necessary, for the sake of further description, to speak of it as more or less narrow, and name the region in which it is situated.

1. *Linear stricture.* The urethral canal may be obstructed by

a thin membrane stretched across it, with an aperture in the centre, or on either side of it, and having an appearance, in relation to the rest of the passage, somewhat resembling that of the pyloric orifice of the stomach. It occasionally happens that a fold of the mucous membrane obstructs the passage at one of its sides only, forming a crescentic septum, and so obstructing a segment of the calibre of the canal: these constitute what has been called "the bridle stricture."

2. *Annular stricture.* Those instances in which the contracted part is thicker and broader than the foregoing description would include, have been termed annular strictures, which present an appearance as if a piece of cord had been tied round the canal at one point, leaving the remainder free.

3. *Indurated annular stricture.* This term may apply to those cases of confirmed stricture in which the induration is seen to extend into the tissues around the urethra, to the depth of half a line or a line: although it may be limited in extent from before backwards to a space occupying less than half an inch of the canal. The centre of the space is the point at which the contraction is most considerable, so that the affected portion presents a form somewhat resembling that of an hour-glass; and it is worthy of remark that the induration is generally thicker at the floor than on the upper aspect of the urethra.

4. *Irregular or tortuous strictures.* In a few instances, some of the natural rugæ of the urethra seem to be adherent, or even fused together, for the space of a few lines in length. In very rare cases a patch of indurated tissue is seen, resembling a cicatrix, around which the mucous membrane is puckered in radiating lines; the amount of contraction appearing to correspond with the extent of previous loss of substance. But occasionally the contraction extends longitudinally for a considerable distance, and the canal is narrowed, and its walls thickened on all sides, for a length of one or more inches. In these cases the induration sometimes involves the entire substance of the corpus spongiosum, and gives rise to the most obstinate and undilatable form of stricture.

Occasionally several separate strictures may be observed in the same subject. John Hunter records an instance in which he met with six strictures in one urethra. Lallemand and other French writers describe seven or eight. I have never been able to find any such examples. Three, or at the most four, distinct contractions is the highest number I have seen, and the latter is rare.

Origin, nature, and site of stricture. The first effect of inflam-

mation upon the mucous membrane is a swelling or thickening of it, caused by engorgement of the vessels. Then exudation of an albuminous fluid takes place into the submucous tissue, ~~and~~ becomes ~~readily~~ absorbed under favourable circumstances; ~~the condition which exists in simple inflammatory stricture.~~ But when the morbid action persists, more or less plastic material is thrown out, the result of which is, the formation of a fibrous tissue around the canal, causing adhesion between the mucous membrane and the submucous tissue, infiltrating the meshes of the latter, and even involving the substance of the corpus spongiosum itself.

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be Drift

A widely-differing condition to any of those above described has been referred to by some under the title of stricture. Sometimes, but by no means frequently, an exudation-deposit upon the surface of the urethral mucous membrane is said to cause occlusion of the canal. Few cases are on record, nor are many examples to be found in our museums; and it is now quite certain that this condition must be regarded as extremely rare.

Speaking in general terms, the degree of contraction is proportioned to the duration of the complaint, and to the extent of the inflammatory action which has existed; although the severity of the symptoms, the amount of distress, and the effects on the constitution, are by no means always commensurate with the amount of narrowing which exists. It is very rare indeed to find the urethra altogether impervious during life to the flow of urine. However contracted the canal may be, the urine still issues either in a very small stream or by drops. Retention does not depend on absolute organic impermeability. It is easy to conceive that when the canal is contracted to a mere pin-hole, the slightest cause may operate to occasion total obstruction; a little tumefaction of the part, a pellet of thick mucus, a flake of fibrinous deposit, or a very small calculus, are quite sufficient to block up the channel. Probably the sides of the urethra never adhere, and cause obliteration of the canal; unless indeed fistulæ have been established, when, although very rarely, this accident may happen in that part of the canal which is anterior to the stricture. But even then it occurs almost invariably in those strictures which are of traumatic origin. The urethra may be cut across by a wound in the perineum, and for want of proper attention the urine may pass entirely through the artificial opening, and adhesion seal up the proper passage. But such obliteration is a wholly different thing from stricture, and ought not to be confounded with it.

Locality of stricture. After a laborious investigation of this subject, respecting which there has long been much difference of opinion, comprising the examination of 270 preparations in our principal museums, I have arrived at the following results. All examples of the disease may be comprehended, in relation to this inquiry, in three distinct classes:

1. *Strictures occurring at the sub-pubic curvature, i. e. at the junction between the spongy and membranous portions and its vicinity; the latter term comprising an inch of the canal before, and three-*

quarters of an inch behind, that point, thus including the membranous portion.

That part of the urethra which is most frequently affected with stricture is the posterior or bulbous part of the spongy portion. The liability of this part to stricture appears to diminish as it approaches the deep fasciæ, behind which stricture is very rare. Most rarely is a stricture found so far back as the posterior part of the membranous portion.

2. *Strictures occupying the centre of the spongy portion, i. e. a region extending from the anterior limit of the preceeding to within two inches and a half of the external meatus, and measuring therefore about two and a half to three inches in length.*

3. *Strictures occurring at the external orifice, and within a distance of two inches and a half of it.*

The following is an analysis of the 270 preparations referred to; they exhibit 320 distinct strictures :

Total number of strictures, 320 :

„	in region 1		215, or 67 per cent of the entire number.
„	„	2	51 „ 16
„	„	3	54 „ 17 „ „ „
320			

Of these

There were 185 examples of *one stricture only*, situated in region 1.

„	17	„	„	„	2.
„	24	„	„	„	3.

There were 8 cases in which the urethra was strictured in all three regions.

„	10	„	„	„	in region 1 and 2 only.
„	10	„	„	„	1 „ 3 „
„	13	„	„	„	2 „ 3 „

Respecting so-called “prostatic stricture,” it may suffice to state that there is not a single case of it to be found in any one of the public museums of London, Edinburgh, or Paris, nor have I ever met with an example. It must be concluded that some observers who describe prostatic stricture have been deceived in reference to it, or that it owes its supposed existence to inferences drawn from the results of examinations of the living body, which can by no means be admitted as evidence on this subject.

Causes of organic stricture. There are two principal and distinct species of lesion which give rise to the formation of stricture of the urethra. The first, and that which by far the most frequently operates, is inflammation in the canal; the second is, injury by violence.

The first-named process, viz. the inflammatory, in the great majority of cases, fortunately terminates by resolution, and leaves the urethra as healthy as before. Whether the urethritis be gonor-

rhœal, or of non-sexual origin, this is the ordinary result. But in exceptional cases, occurring in some instances probably from indiscretion on the part of the patient, in others from violent treatment, and in others from a constitutional indisposition to terminate inflammatory action, this latter persists and extends from the mucous membrane to the submucous tissues, and to the erectile structures around, throwing out plastic matter, which, not being reabsorbed, becomes organised, glues together the organic muscular layer which immediately underlies the mucous membrane, and incapacitates the fibres from performing their function of relaxing when patency of the canal is required. Habitually so arranged as to effect the closure of the urethra, these organic fibres become more or less permanently fixed in apposition by the plastic lymph which has permeated their connexions; and in this manner an organic constriction is produced.

Whatever be the cause of the inflammation, such is the process which constitutes it the cause of stricture. As before said, gonorrhœal inflammation is the chief and common agent. But it is not the acute complaint, so much as a persisting chronic or subacute affection, which seems to lay the foundation of organic stricture. Hence a long period often elapses between the acute attack and the first symptoms of obstruction. These latter appear often very insidiously and slowly, and at first perhaps scarcely excite the attention of the patient. Thus it is that a period of many years is often passed before the existence of the organic change has become obvious.

The next principal cause of stricture is mechanical injury. Blows on the perineum, bruising, lacerating, or partially destroying the urethra, are received in a variety of ways: by falls on some hard object, as across spars, scaffolding, ladders, chairs, gates, wheels, saddles, &c.; or on some sharp object which punctures the perineum, as pallsading and other fences, from earthenware vessels which break under the sitter, &c.; again, laceration may occur from the bones in pelvic fracture; lastly, all violence in the use of surgical instruments must be admitted as another traumatic cause. In all these cases the wounded urethra often unites irregularly, or loss of substance takes place, and the cicatrix resulting permanently contracts the part. The strictures so formed are among the most obstinate and difficult to treat which come under our care.

An occasional cause of stricture is cicatrization following chancreous or other ulcers which have occasioned loss of substance. The results of these are usually observed at the external meatus. After amputation of the penis, the opening of the urethra is also sometimes narrowed in a similar manner.

Narrowing of the urethra, occurring generally within half an inch or an inch of the external meatus, is occasionally met with as a congenital formation. It is remarkable that it may exist up to the period of adult life without occasioning the smallest inconvenience, indeed without being discovered, and subsequently become the source of severe symptoms. The tissue appears to become in later life less extensible, and to interpose a serious obstruction to the outflow of urine.

Symptoms. Among the early symptoms, slight urethral discharge is often noted, and its presence sometimes masks the true cause. Pain is usually felt in the urethra, behind the stricture, at the time of micturition. The contents of the bladder are emptied at shorter intervals than has been natural. The stream is altered in form, becoming more or less flattened; perhaps twisted, spirting, forked, or even divided; which conditions are caused by the current of water being insufficient in size and force to dilate and extend the lips of the meatus externus; but it must not be concluded that the mere existence of such a stream is a proof that stricture exists, since many persons, from a tumid condition of the meatus alone, habitually pass such a one. As contraction increases the stream grows smaller, the momentum of the current is lost, and in time the urine may issue only by drops. Generally speaking, the act of micturition is always prolonged to an extent corresponding with the degree of obstruction present. Ultimately the acts of micturition become very frequent and painful, some patients being compelled to rise from bed many times in the course of the night; while in the worst cases, or during temporary exacerbations, a great portion of the time is spent in laborious and unavailing efforts, by change of posture or by straining, to obtain some relief. Tenesmus of the rectum is thus often induced, leading to protrusion of the mucous membrane through the external sphincter, and sometimes to troublesome prolapsus. In bad cases the patient can rarely attempt to empty his bladder without visiting the water-closet, through his inability to prevent the escape of the contents of the rectum from the efforts required for that purpose. Pains in the perineum, the testicles, the loins, and the hypogastric region, are usually present in such cases.

In some few cases the most prominent symptom throughout is retention. There may be but little irritability of bladder, and the stream of urine, when passed, is not necessarily very small; a No. 6 or 7 catheter may pass through the urethra; but a true organic stricture is present, and may perhaps be verified by the touch, as a

ring of indurated material in the course of the urethra. The patient is liable to frequent retention, and finds no relief but from catheterism, while attempts at dilatation are followed by inability, more or less prolonged, to pass water, until an instrument of very large size has been reached.

The urine also shows signs of change, which become more marked in proportion as the case advances. A portion being retained in the bladder, from inability to overcome the obstruction, the secretion becomes partially decomposed, and irritates the mucous membrane; and thus urine, cloudy, ammoniacal, and depositing as it cools a quantity of pus and mucus, is not an unfrequent accompaniment of stricture. It is usually alkaline, deposits slimy tenacious mucus, and also a precipitate of the prismatic crystals of the triple phosphate of ammonia and magnesia, of exudation or compound granular corpuscles, epithelium, and some pus; while on its surface an iridescent film or pellicle collects, commonly consisting of the triple phosphate, and sometimes of the phosphate of lime. Hæmaturia is also one of the occasional concomitants of stricture. Blood sometimes comes from the bladder, in small quantity, communicating a dark tint to the urine. It frequently follows the use of the catheter, but it appears also when no instrumental interference has taken place; or it may be due to the rupture of vessels during erection, the urethra being unduly confined by the presence of the stricture, and strained by the act (see Hæmaturia, p. 335).

Retention and engorgement. As the case advances, attacks of complete retention, depending on the causes above mentioned, become more frequent. The urine is at length habitually discharged by drops, so that a stream cannot be said to exist. Sometimes the urine passes away involuntarily during the unconsciousness of sleep, or during muscular exertions; and at length the patient loses the power to retain it altogether. At this stage "incontinence" is often said to occur, which term does not here apply either to an irritable or to a paralysed condition of the bladder, incapacitating it to retain its contents, although it has frequently been mistaken for this. The urine constantly dribbling off infects the patient with a urinous odour, and, despite all precautions, excoriates the skin, stains the clothes, and renders him offensive to himself and others. But these symptoms, in nine cases out of ten, indicate that the bladder is distended, and that the surplus only runs off in the manner described, the organ remaining filled with the staler portion of the urine, unless it be frequently emptied by the catheter. Thus it is a state of retention, or of engorgement, rather than of incontinence. The

extent of dulness on percussion over the pubes will indicate this condition, and also the size of the tumour formed by the distended viscus. Under these circumstances disease of the bladder is increased, and disorganisation more readily induced than before. Thus ulceration may occur in its mucous membrane, or in that of the urethra behind the stricture. Under such circumstances, in a paroxysm of straining to pass water, rupture of the urethra may take place, and extravasation of urine occur into the cellular interspaces in the perineum, scrotum, and supra-pubic region (see Extravasation of Urine).

Besides the local symptoms of stricture, there is usually disorder of the digestive organs, followed by the consequences of impaired nutritive function. The patient loses flesh and strength, looks anxious and careworn, complains of pains in the back and loins, and often becomes the subject of severe attacks of shivering. Others invariably experience rigors after the passage of a bougie, or if an instrument but one number larger than the accustomed size be passed. Such an occurrence appears to be more common among those who have long inhabited warm climates. The application of an irritant or corrosive substance to the urethra is also not uncommonly followed by some general fever. So well known is this phenomenon, that it has received the special name, and not inappropriately, of "urethral fever." It often occurs after the first act of micturition following the application of the irritant, as if from contact of urine with the abraded urethra, or with the wound if incisions have been made. Sometimes it is intermittent in its character. When renal disease exists, these symptoms are more prone to occur; so that we may suspect the presence of such disease when severe rigors constantly follow slight urethral irritation in patients not predisposed, by climate or otherwise, to experience them, and who have suffered for some time from stricture. I have observed, on more than one occasion, suppression of urine, rapidly followed by death, to result from the introduction of an instrument larger than the patient has been accustomed to; or again, when the ordinary instrument has been less skilfully employed, and an abrasion, although only an exceedingly slight one, has been made in the mucous membrane of the urethra. The rapidity with which death may occur, under these circumstances, in patients who are the subjects of extensive chronic disease of the kidneys, from an apparently exceedingly trifling lesion so caused, is remarkable. It seems to be due to uræmic poisoning; the post-mortem appearances, to the naked eye, do not necessarily exhibit traces of inflammation resulting

from the particular lesion. In these cases it appears that the function which determines the elimination of urea suddenly ceases after slight injury to the urethra, as by the propagation of some shock to the excreting organ, in cases where the kidneys are largely diseased. And there are undoubtedly sometimes, although rarely, instances in which the fatal result ensues in this manner from the mere passing of a catheter, although it is absolutely certain that no mechanical injury whatever has been inflicted.

From the symptoms which present themselves three classes of organic stricture may be made, which will embrace all the varieties of the disease, and so serve as a means of describing in brief terms any particular example in the living patient.

1. *Simple stricture.* Its chief sign is diminution in the size of the stream; there is increased frequency of micturition also with some pain, although the amount of either varies greatly in different cases.

2. *Sensitive or irritable stricture.* Proneness to disturbance of the nervous system, as evidenced by chilliness, irregular circulation, or even rigors on very slight irritation. Great pain is caused even by the gentle application of instruments, and it continues sometimes long afterwards. In a few cases also a disposition to hæmorrhage is manifested.

3. *Contractile or recurring stricture.* There is constant tendency to become narrower in the absence of treatment; and contraction rapidly recurs after dilatation has been applied.

Diagnosis and treatment. Dilatation. The symptoms just detailed are not sufficient alone to establish the presence of stricture: it is necessary to examine the urethra with an instrument to ascertain whether an organic obstruction exists, whether one or more are present, their calibre, and what extent of the canal is involved.

For this purpose instruments of various forms and compositions are used: some are soft and pliable, others elastic, others inflexible and solid. As a rule, to which there are unquestionably exceptions, the latter description is to be preferred; first, because there need be no doubt as to the direction which the point of a solid instrument takes in its passage; and secondly, because the movements which the point makes can be exactly controlled and determined by the hand which holds the opposite end of the instrument.

Catheters and bougies may be either straight or curved. Generally speaking, those which are moderately curved pass with the greatest ease both to the operator and to the patient. The best curve, perhaps, for common use is that which corresponds most nearly with the bend of the urethra at its inner third, and which

may be regarded as approximating to that described by an are rather less than one-fourth of the circumference of a circle $3\frac{1}{4}$ inches in diameter. Straight instruments may be easily passed with ordinary care; but they are not to be preferred, and not commonly to be employed except for strictures in the ante-scrotal portion of the urethra.

In introducing the catheter, a uniform plan should be followed. If the patient stands, the heels should be a little apart, the nates resting lightly against the wall or similar support behind. An appropriate instrument having been selected, it should be warmed, and smeared with oil or lard. In introducing it, the handle should be lightly held between the thumb and the fore and middle fingers of the right hand, the concavity of the curve looking towards the left groin of the patient, and the general direction of the instrument being almost horizontal. The penis is to be raised with the left hand, the point of the instrument inserted into the urethra and slowly carried onwards until four or five inches have disappeared; the handle is brought to the middle line at the same time, at first close to the patient's abdomen, after which it is to be gently and lightly depressed; and as the point is felt to traverse the sub-pubic curve, the handle is gradually brought down towards the operator, until it sinks beneath the horizontal line, when the opposite extremity will be free in the bladder. If difficulty occurs, the direction of the instrument may be slightly altered, or it may be withdrawn an inch or so, and then re-introduced with the handle more upright than before, or the reverse, as the case may require. If, notwithstanding all, the instrument is stopped point blank, and at the same spot on each trial, there is reason to suppose that stricture is encountered. On the other hand, if the urethra is healthy, a solid sound of good size will pass almost by its own weight if lightly handled; at all events, a very slight pressure from the fore-finger upon its handle will be amply sufficient, if additional impetus be required. It is never to be forgotten that a powerful lever is in action when the handle is depressed, the resistance of which bears on structures which may be easily perforated if undue force be applied. Whatever the obstruction, it is never to be forced: temper, patience, and a light hand will overcome almost all cases of difficulty. All attempts at rapidity of execution are wholly out of place, fraught only with danger to the patient, and calculated to reflect discredit on the operator.

That mode of passing a catheter which has obtained the term of the "*tour de maître*," is only rarely advisable. It consists in

introducing the instrument with the convexity of its curve upwards, and with the handle in a perpendicular line beneath; in carrying it to the deep perineal fascia in this direction, and when it has arrived at that point, in sweeping it round adroitly so as to describe a half circle, of which its point is the centre; at the same time gradually depressing the handle to carry the instrument through the sub-pubic curve.

In the majority of cases, the recumbent position is best, especially if much time is required for the purpose. The head and shoulders should be slightly elevated by pillows, and the knees a little raised and separated from each other; the operator should stand on the left side of the couch, hold the catheter as before directed, and introduce it over the patient's left groin, the handle being in the horizontal direction; he should support the penis with the left hand, placing the palm upwards, so that the middle and ring-fingers hold the penis just behind the corona glandis; the index-finger and thumb are then at liberty to be applied for the purpose of retracting the prepuce if necessary. The beak of the instrument having been introduced, it should at first be maintained against the inferior wall of the canal to avoid a lacuna on the roof, sometimes considerably developed; an accident which gives the patient pain, and sometimes disconcerts an operator. The fingers of the left hand gently draw the penis over the instrument as it glides easily on to the bulbous part, the handle still being horizontal, or nearly so; arrived at which, if some obstruction seems to offer, the instrument should be withdrawn an inch or so, and again passed, taking care not to elevate the handle so soon; after which, by gently raising it and causing it to describe a curve along the middle line, the extremity will probably glide slowly upwards into the bladder as the handle sinks towards the interval between the patient's thighs.

In exploring the urethra, especially if the symptoms are not well marked, we are not hastily to conclude, because a little obstruction presents itself in the passage, that stricture is of necessity present. The part is extremely sensitive, and resists any but gentle efforts to traverse it, the more so if it be the first time an instrument has been introduced. Sometimes at the neck of the bladder itself a little more than usual depression of the handle of the catheter is required, or it may be necessary to employ an instrument with a stronger and longer curve.

The size of an instrument to be first used is by no means a matter of indifference. As a rule, whatever statements the patient may make, we should *always* use a bougie or catheter, not smaller

than No. 7 or 8, with a blunt, not conical, extremity, as such will afford far more certain indication of the situation of the obstruction than smaller sizes, which might pass through a slight constriction altogether; or whose point may be entangled in a lacuna, or in a fold of mucous membrane, the first of which would have been closed, and the second obliterated, by the passage of an instrument sufficiently large to fill the urethra. By such entanglement, perhaps, injury may be inflicted on the canal, or the unfounded belief in the existence of abnormal obstruction in it may be induced.

Suppose, however, that a stricture is encountered, its distance from the external meatus should be accurately noted and its situation remembered. Then a smaller instrument is to be passed, in order to determine the calibre of the stricture; if this enter the contracted part, it is at once obvious by its being "*held*," *i.e.* it has entered a narrower passage which fits closely to and retains it, so that on attempting to withdraw it, some force is necessary for the purpose. A trial of several instruments may be necessary, until at last one which is sufficiently small to enter the constriction is arrived at: but we should always bear in mind that the smaller the instrument the more careful and the more sparing of pressure must the operator be, since such an instrument will inflict a wound with ease directly proportioned to the smallness of the point.

The instrument should next be carried on by way of search for another stricture, especially if the first be in the anterior part of the canal. It may, however, be so firmly grasped, and its freedom of motion be so interfered with, that it is not easy to judge accurately with respect to obstacles situated deeper in. If so, another kind of sound may be used with advantage, *viz.* one of small size, having a bulbous or olive-shaped extremity two or three sizes larger than the stem; this being made to pass with some little difficulty through the first stricture, it will be apparent enough when the bulb becomes free on the farther side, and the existence of another contraction will be more readily diagnosed than with an ordinary sound.

Some operators have strongly advocated the use of a wax bougie with a softened point, for the purpose of obtaining by gentle pressure what they believe to be an "*impression*" or "*model*" of the stricture. I have nothing to add respecting the merit or advantage of such a proceeding.

Treatment. Its object is twofold:

First, to restore the natural calibre of the canal, so far as is consistent with the safety and comfort of the patient.

Secondly, to maintain the adequate patency of the canal afterwards.

Now, since strictures vary in amount of contraction, in dilatability, in dis-

position to return, in local sensibility, and in liability to manifest sympathy with other parts of the body, &c., various modes of treatment are necessary, appropriate to different cases. Hence innumerable inventions for the fulfilling of the above indications have been described, and modes of treatment proposed. All, however, may be resolved into three classes. The opposing tissue of the stricture is either dilated, gently or forcibly; or it is wholly or partially destroyed by chemical agents; or it is divided by some cutting instrument; and of course all these processes may be more or less combined with certain general or constitutional treatment.

Dilatation. This is the mildest and the most desirable treatment to employ whenever the case admits of it; it is also the most generally applicable, and the best adapted to a very large proportion of all the cases presented to our notice. It is the method which almost all Surgeons agree to use as the rule, availing themselves of other means when its action is either not effective on account of the impermeability of the stricture, or insufficient to enlarge its calibre from the unyielding nature of the obstruction, or impracticable from the acute sensibility of the urethra. The history of surgery shows that it is still the most ancient mode, having been employed for the destruction of "carinities" in the time of Galen, and never having been superseded to the present day.

To apply it in ordinary cases, a solid sound or a bougie, as large as the stricture will easily admit, should be passed fairly through it, and then be at once withdrawn with as much care and gentleness as was employed in introducing it: a note of the size should be recorded, and the patient desired to come again in three days: the same sound may then be passed, perhaps with greater ease than before; if so, it is to be withdrawn at once, and the next size larger introduced, provided it requires no undue force to do so. The visit may be repeated in three days, sometimes in two (but not sooner), if neither pain, nor bleeding, nor much smarting in micturition, follow and continue after the operation. Sometimes a fit of shivering occurs, or the patient may be faint or sick, which are not unfrequent effects of the passage of an instrument, more especially for the first time. If any of these phenomena take place, the interval should be lengthened a day or two, and the condition of the health examined. If the patient complains of soreness of the urethra, and that micturition is painful, the urine is, perhaps, unduly acid, and it will be desirable to regulate his diet and habits so as to promote a healthy character in the secretions generally. At the same time, if it be so, he will generally derive benefit from a little bicarbonate or citrate of potash, combined or not, as occasion may require, with hyoscyamus, and taken three or four times a day; or, the alkali may be given in decoction of uva ursi, or infusion of buchu, if the mucous membrane of the bladder seems to be irritable, or disposed to secrete too freely. Irritability of the urethra, however, is much allayed by the gentle and careful use of instruments. Even when much suffering is produced at the first attempt, it usually becomes notably less at every succeeding passage of the sound. In some cases, however, where much pain is experienced in passing metallic sounds, a wax or gum-elastic bougie may be easily borne, and will then be more efficient.

Supposing none of these consequences to happen, the same plan of gradual advance may be continued at each visit, so that No. 10 or 11 may be soon safely reached in such a case as that described, when a very fair amount of dilatation has been achieved: if the urethra is of the ordinary size, if the last step or two in the progress have been easily made, without pain or annoyance to the patient, it is well to go on to No. 12 or 13. Finally, the maximum point of dilatation arrived at, should be maintained for a short time, the largest-sized instrument employed being used at gradually increasing intervals of time, in order to maintain the ground which has been won.

If, however, the case is more difficult, and after the use of a smaller instrument no penetration is effected, it is desirable to see the patient make water; if the stream is small, the size of the instrument should correspond with it; if it is not, the contraction cannot be very considerable, and some fold of membrane, or perhaps a false passage, has entangled the point; and in any case the sound to be tried next should be as nearly as possible of the size of the stream.

In introducing it, the floor of the urethra, as well as any lateral deviation in its course, are to be avoided, these being favourite situations for false passages. Failing of success in one direction, we should next cautiously carry the point towards each of the others, trying patiently for a short time to insinuate it either above, below, or on either side of the passage, if the slightest sensation of its being "held" indicates that the orifice exists in any of these directions. And when the instrument has thus become a little grasped, we should endeavour to facilitate its progress by patient, continued, and moderate pressure, the precise amount of which should be proportioned to the degree which the patient will bear without much complaining. Some minutes should be devoted to the attempt, the success of which will much depend upon the steadiness and singleness of purpose with which it is pursued. Sometimes the introduction of the left fore-finger, previously oiled, into the rectum, will facilitate the progress of the instrument, either by permitting its point to be raised to some extent, or by enabling us to judge more precisely of its exact locality and relation to the parts around.

The employment of continued pressure on the face or commencement of an indurated and not very sensitive stricture, is sometimes successful, either by inducing absorption, or by mechanical action upon the yielding materials of the obstruction. The operator, however, should be certain that he is really acting on the contraction, and not following or making a false passage. It is important to remember, as an invariable rule in relation to these attempts, that when the instrument is tightly grasped, the operator may infer that its point is safe within the strictured part, but that when the point feels free, movable, and capable of being withdrawn without appreciable effort, it is certainly not in the stricture; it may be, in such circumstances, in a false passage. If, after being grasped or "held," it advances suddenly for a short distance under pressure, and becomes movable, it is probable that a false passage has been made and the urethral walls perforated; after which unfortunate occurrence all further efforts must be given up, at least for several days, and the employment of instruments, when again resorted to, must be conducted with vigilant care, to avoid any re-opening of the lacerated part.

If after several applications of the instrument the stricture is still not passed, or if the case at its commencement appears to be more than usually difficult, we must take still further precautions to insure success. It is preferable to visit the patient when in bed, with the skin warm and moist from ample coverings. A hot hip-bath just before the visit is sometimes advantageous. When introducing the instrument, all unnecessary exposure should be carefully guarded against. Premising that the situation of the stricture has been carefully verified beforehand, a silver catheter should be selected, the size of which should be a little less than that of the stream of urine. Next, it is obvious, when oiling the instrument, that the smaller it is the less will be the quantity of oil which adheres to it. It is desirable, therefore, to apply the oil *to the urethra itself*, rather than to the instrument, injecting, by means of a common glass syringe, four or five drachms of olive-oil. This proceeding facilitates the progress of a small instrument to the stricture, and tends to open the latter by the penetration of the oil into the narrowed passage itself.

When the stricture has been passed, considerable care is necessary in guiding onwards the point through the canal behind, to prevent its becoming engaged in the enlarged lacunæ which are commonly found here. These are usually on the floor; and not a little patience and management are sometimes required to carry the point of a slender instrument over them and lodge it safely in the bladder. Usually the point has to be tilted upwards somewhat; and here it is that the finger in the rectum is most commonly of use.

False passages are some of the most perplexing complications of a narrow stricture which the operator has to deal with, inasmuch as the difficulty of getting into the right opening is greatly increased by the readiness with which the instrument enters the wrong one. It is to be remembered that, as a rule, false passages most frequently commence on a level *below* that of the proper opening; and that the operator's finger when in the rectum, near to which the false pass-

age is almost certain to run, will inform him as to the route which the catheter is taking, whether it be too close to the gut or deviating to the right or left of the median line, and will also assist him to direct the point in its true course.

The influence of chloroform has been sometimes found extremely useful in facilitating the passage of a catheter or sound through the urethra, especially when it is more than ordinarily sensitive, and the pain occasioned by instrumental interference produces uncontrollable and involuntary efforts of resistance on the part of the patient. It is to be remembered that it is not for the purpose of permitting the instrument to be used with greater force than before, but in order to produce relaxation of the muscular tissues, both of the voluntary and involuntary kinds, that the chloroform is administered; and it must, of course, be given to a sufficient extent to insure this result.

Continuous or permanent dilatation. A very useful means of rapidly dilating a stricture which has been obstinate under ordinary treatment is that of retaining the catheter in the urethra for forty-eight or seventy-two hours at a time, without removing it. Especially when great difficulty has been encountered in its introduction, this treatment is frequently of great value; if, owing to extreme sensibility, each introduction of an instrument is followed by much pain or by rigors, it is sometimes one of the most efficient methods which can be adopted. In putting it into execution, a week or two of confinement to the house must be reckoned on. The catheter having been introduced, it may be fastened by bandages round the body; for this purpose one may be carried round above the hips, another is connected with this, on each side, near the crest of the ilium and passed under the thigh, returning again to the crest, and then made fast. The catheter is then secured by a piece of narrow tape to the bandage on each side near the tuber ischii. A peg of wood is fitted to the orifice of the catheter, or, better still, a piece of india-rubber tubing attached, with the other end in a suitable vessel. Or if it be a gum catheter, it may be attached to a piece of plaster lightly encircling the penis.

In the management of this process, three points should be attended to: first, the catheter when tied-in should not project into the bladder, or at any rate but very slightly; the proper distance is readily ascertained by observing the flow of urine through it, and drawing the instrument outwards until the stream just ceases; a very small portion only of the catheter can then remain within it. Secondly, if the first catheter passed has been a silver one, the succeeding instrument should be of gum-elastic, as causing less irritation, indeed rarely any, while the process of dilatation is quite as efficient as when metal catheters are employed. Thirdly, in no case should an instrument be permitted to remain in the urethra which fits tightly in the stricture; more real progress will be made by always using a catheter which lies loosely in the canal, than one which is large enough to be grasped by the contracted portion, while in the latter case irritation is liable to be caused, which may produce unpleasant consequences. During the period of remaining in bed, the patient may sometimes take fifteen or twenty grains of nitrate of potash four or five times daily, in as much water, or barley-water, as he pleases, for common drink; and a little hyoscyamus or opium, if pain or irritation render it necessary. The latter may be given in the form of suppository; but this is rarely necessary if proper care is taken in the management of the catheter, which is the most important part of the treatment. If, however, blood appears in the urine, or fever, or swollen testicle, the catheter must be withdrawn at once.

Usually, in about thirty-six hours, a purulent discharge is seen around the instrument, which soon becomes loose in the canal, although when first introduced it may have been firmly retained by the stricture. It may then be replaced by another two sizes larger, which will probably enter easily. In a day or two a similar advance may be made; and if all go well, this progress may be continued for five or six days; the patient sitting up daily for a few hours, if the gum catheter is employed. If he is fatigued, a day or two's rest may be given, and the plan resumed if necessary. When a full size has been reached, the catheter is to be withdrawn, and an instrument passed daily for a few days, gradually increasing the interval, but endeavouring to retain as much as pos-

Fig. 2.

The instrument employed by Mr. Holt.



sible of the calibre gained; a certain degree of recontraction at first, however, is always met with.

Mechanical apparatus for effecting dilatation. Among various forms of special apparatus may be noticed a method adopted by Mr. Thomas Wakley, which consists in sliding tubes over a small urethral guide first passed into the bladder; so that if the route is at first correctly taken, all the other tubes will follow the same course. Different methods of using sliding tubes were formerly adopted by Dr. Buchanan of Glasgow (1831), Dr. Hutton of Dublin (1835); by Desault (1797), and Maisonneuve (1845). The attempt has been frequently made to dilate a stricture by means of a single instrument which expands in situ, in the place of several instruments of increasing calibres which require to be successively pushed through the constricted part. With this object Mr. Luxmoor (1812) employed diverging metal rods; Leroy d'Etiolles the same method, some years later; and M. Perrève a somewhat similar plan (1847); Dr. Arnott commenced the employment of fluid expansion (1819). In a lesser degree, the accomplishment of the same object has been attempted by the use of cat-gut bougies, and very recently by bougies of Laminaria, a species of seaweed which expands in contact with moisture. A German Surgeon formerly, and Reyhard of Lyons more recently, have employed metallic expanding instruments for the same purpose; although the latter chiefly employed such instruments for maintaining apart the incisions after urethrotomy. But he proposed this method also for effecting dilatation by progressive steps, with the view of carrying it to a higher degree than could be attained by any instrument the extent of whose expanding power is limited by the size of the external meatus, which is well known to be the narrowest part of the urethra. More recently, Mr. Holt has adopted the method of forcible rupture by means of an instrument precisely similar to that of Perrève, and has operated many times with success, and a greater freedom from serious consequences than would generally have been supposed, since he ruptures the stricture with considerable force.

In considering these, and numerous similar means which have been employed, it is impossible to forbear remarking that the essential part of the process of *dilatation* (I mean dilatation as distinct from rupture) is a vital, and not a mechanical one, and that complicated apparatus is not so efficient for that process, or so desirable as the employment of a simple sound when passed with tact and gentleness, and with a light hand. Were catheterism simply an affair of overcoming mechanical resistance, the expedients of the engineer would naturally commend themselves; but we must remember that, in the prosecution of dilatation, where the object is to avoid producing lesion, the delicate tube of the urethra and its important connexions are to be treated as tissues endowed with vital functions and relations of the highest importance.

On the other hand, it is a remarkable fact, which I have now completely verified, that while an old and obstinate stricture may be dilated up to a certain moderate degree, beyond which the slightest advance sometimes produces severe constitutional symptoms, the same stricture may be distended or ruptured at once up to the natural calibre of the urethra without any such symptoms. I have seen this as the result of Mr. Holt's method, and also from the use of an instrument employed by myself, which distends the stricture alone to a calibre of 14 or 16 of the catheter-scale, but without involving

the healthy part of the urethra in its action. If, however, forcible dilatation be applied to an old and rigid stricture, after the method in vogue thirty or forty years ago (Mayor), that is by driving a large conical metal bougie through the obstruction, severe symptoms are almost infallibly incurred. Force so employed, and not exerted from within outwards as in the distending instruments referred to, pushes the stricture down the canal, loosens its cellular connexions, and infallibly produces inflammation and fever.

Mr. Holt describes his mode of operating as follows: The instrument "consists of two grooved blades fixed in a divided handle, and containing between them a wire welded to their points, and on this wire a tube (which when introduced between the blades corresponds to the natural calibre of the urethra) is quickly passed, and thus ruptures or splits the obstruction." Having introduced it, and "reached the bladder, the dilator should be gently rotated, to prove that it is fairly within that viscus; and being thus assured, the Surgeon is next to place the point of the tube he had previously selected upon the wire between the blades, and thrust it quickly onwards to the end. The stricture being now fairly split, the dilator should be rotated, to still further separate the sides of the rent, and then be withdrawn; a catheter corresponding to the number of the tube being substituted for the purpose of removing the urine."* The catheter is then removed, the patient treated with quinine and opium for the first twenty-four hours; and the same catheter introduced in forty-eight hours; and again on alternate days for a week or two, gradually lengthening the interval.

We are under obligations to Mr. Holt for perseveringly pursuing his practice by rupture, by which the remarkable facts previously referred to have been demonstrated. I do not hesitate to say, that many of the cases which have hitherto resisted dilatation may be successfully dealt with by that method, whether applied in his manner or by my own. The cases in which these methods appear most likely to be valuable are those in which the morbid material constituting the stricture does not form too thick or dense a mass to be entirely ruptured. Where the stricture forms a large and hard nodule, it may, perhaps, be better to divide it with a cutting instrument. For many, however, of the cases which have been hitherto so treated, I believe the plans in question offer considerable advantages. To rupture a stricture appears at first sight a harsh and rough proceeding; but a careful and unprejudiced examination of its results on a large scale, and some personal practice of it, has convinced me that it deserves the character accorded to it here.

The plan which I have adopted and prefer is as follows: The instrument consists of two long and narrow steel rods, accurately applied to each other, but both forming when closed a cylindrical instrument the size of No. 3, 4, or 5. These rods are united at each end and throughout four inches of the shaft, and are surmounted by a handle containing a screw, which when turned causes the rods to diverge from each other very slowly and gradually, at a given spot, forming a spindle-shaped figure three or four inches in length, and the third or half of an inch in diameter.

Fig. 3.

Distending instrument: the blades are opened to the full extent. The index is seen just below the handle.



* *The immediate Treatment of Stricture.* B. Holt. London, 1861, p. 7.

There is an index near the handle which shows the exact degree of distension made, by pointing out that number of the catheter-scale which is reached, as the operation proceeds (see fig. 3). The reason for carrying distension beyond the size which the meatus of the urethra will admit, is the fact, too often overlooked, that the great majority of strictures, that is, those situated at or near the bulbous portion of the urethra, occupy a part of the canal which naturally possesses a calibre of at least 16 or 18 of the catheter-scale, and that ordinary dilatation up to No. 10 or 12 inefficiently acts upon them. The method of applying the power by this instrument differs materially from that in others, in being made very slowly (better therefore under the influence of chloroform), so that from seven to ten minutes are occupied in slowly reaching the maximum point of distension; the object being to overstretch the morbid tissues as much, and to rupture them as little, as possible, in order to destroy, or, at all events, to greatly impair, the natural tendency of the stricture to contract. Before operating, the distance of the stricture from the external meatus is measured by passing a full-sized bougie down to the stricture; the slide is then placed upon the figure on the stem which denotes that distance. The instrument is passed until the slide arrives at the meatus, and the blades are slowly separated: when the maximum distension is reached, the screw is turned back only about half-way, so as not to close the blades; the instrument is withdrawn; a full-sized gum catheter is at once passed, and allowed to remain twenty-four hours. On the third day after the operation a large metallic sound is passed, and subsequently at longer intervals. During the past year I have thus operated on several cases, and with the happiest results.

To return to the subject of gradual dilatation, and particularly to its employment for old and irritable strictures: in such cases, especially when occurring in enfeebled constitutions, it is necessary to proceed with great caution. More progress will be often made by employing those adjuvants, which a deranged state of the constitution requires, than by pertinaciously continuing the use of the bougie when the stricture is unusually obstinate; this is a maxim of the first importance. Further, having arrived at any given number in the scale, say 6 or 7, beyond which it is difficult to proceed, we may sometimes gain ground by employing half or intermediate sizes, which I have been in the habit of thus using for many years. Or we may employ the French scale, which gives 18 numbers between our numbers 1 and 12, and so admits of more gradual steps in the treatment; the number 3 of the French scale equalling our number 1, and the 20 our number 12; these have the advantage of indicating the exact calibre of the urethra through which they have passed, the number of each indicating so many millimetres of circumference.

There are some cases unquestionably in which, however much of pains and care, of adjuvants local and general, have been expended, the patient's existence is barely a tolerable one. The urethra and bladder are so sensitive, or the stricture is so contractile, that exquisite suffering from instrumental interference, and fever, or retention of urine constant or constantly impending, are the alternations presented. These facts, recognised by all Surgeons of experience, have led to proposals to treat the malady by many other methods. The next to be considered is the treatment by caustic agents.

1. *Caustics.* During three centuries at least, escharotic substances have been employed by Surgeons for the purpose of destroying the obstructions in earlier times supposed to be "callus" or "caruncle," which oppose the passage of the urine. With this view, savine, antimony, mercury, verdigris, quick-lime, vitriol, alun, and other active agents, have been carried by some contrivance or another down to the urethra. John Hunter, in the latter part of last century, brought into note the nitrate of silver; and Mr. Whateley, in the commencement of the present century, the caustic potash. These substances have been supposed by their advocates to act, first, by deadening sensibility, and thus allaying spasm; secondly, by causing to slough, and so destroying, the morbid tissue of the stricture itself; and lastly, by dissolving or softening that tissue, and thus permitting instruments to be passed. A very considerable experience has been obtained by some English and many French Surgeons, the result of which is, that the prac-

tice of applying chemical agents has been for some considerable time steadily diminishing in the hands of the best Surgeons. It has been very generally doubted, if it be possible to limit the application of any soluble substance possessing the active qualities of those two agents, especially those of the potassa fusa, to any given portion of the urethra, particularly in those cases which are complicated with false passages, and which furnish by far the most difficult examples which the Surgeon is called upon to treat. Their use also is by no means free from painful and even dangerous results, such as violent spasm, retention, and fever. Moreover, there is reason to believe that these caustics exert an action upon the urethra similar to that which follows their application on other parts of the human body, and liable to be followed by increased induration, and the formation of fresh contractile tissue. On the other hand, the advocates of potassa fusa especially claim, that after its use the catheter is more easily passed; and, that in cases in which they have been unable to pass any instrument at all, this agent has frequently been successful: while numerous results of this kind may, they say, be referred to. Now, it may fairly be granted as probable, that a certain present advantage may be gained by the method in question, and that in this manner it may in some hands be undoubtedly useful; the remoter effects, however, already alluded to, should not be lost sight of; nor should the very important consideration, that by patience, care, and gentle management, there are very few cases indeed in which a catheter of some kind cannot be introduced fairly through the stricture into the bladder; a result far more desirable than any which is only accomplished by means of caustic applications. The conviction gains ground, both here and abroad, that those cases, which have been called "impermeable," in relation to catheterism, should very rarely be considered so. Perhaps the opinions and practice of the profession abroad, in reference to caustics, cannot be more truly or concisely represented than in the recent words of Nélaton, who states that "cauterisation of any kind is rarely employed now, on account of its uncertainty and the tumefaction of the urethra and retention of urine which it produces, and the new formation of contractile tissue which is likely to result."* In like manner, the widely received opinion in England is thus expressed by Mr. Erichsen: "This practice, stigmatised by Mr. Liston as 'most atrocious,' has now but few advocates; and, indeed, there appears to be nothing that it effects but what can be accomplished much more safely and easily by a catheter or sound in an ordinarily skilful hand."† It may be added, that my own observation and experience lead me fully to coincide with these able Surgeons.

Under such circumstances, little need be said here as to the method of employing these agents. It suffices to state, that the nitrate of silver may be applied by passing a small stilet, on which the salt has been fused, by means of a hollow canula down to the stricture, with which the agent is permitted to remain in contact for a few seconds. The potassa fusa is ordinarily employed by carefully attaching a small fragment, such as the fourth or the half of a grain, to the end of a wax bougie, and then passing it down and pressing it for a moment or two against that structure, whatever it may chance to be, which stops the instrument in its progress along the urethra.‡

2. *Incisions.* Under this somewhat comprehensive term are included numerous modes of dividing the morbid structure which surrounds and narrows the urethra. All may be arranged in two classes: the first contains operations, in which the incision is made altogether within the urethra; the second, those in which incisions commence from without, usually in the perineum, and are carried into the urethra and through the seat of stricture.

The first, or internal urethrotomy, will now be considered. This method of

* *Elémens de Path. Chir.* Paris, 1858, tom. v. p. 409.

† *Science and Art of Surgery*, 2d ed. Lond. 1857, p. 925.

‡ Further information on this subject, if required, may be found in the works of B. Phillips, who first advocated and subsequently repudiated the employment of caustic; of Dr. Jas. Arnott, Mr. Wade, and Mr. H. Smith.

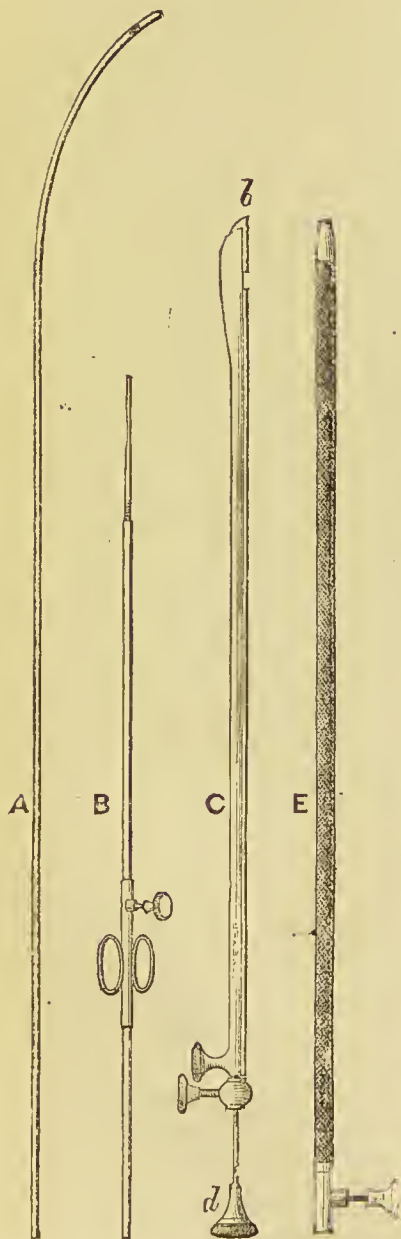
dealing with obstinate stricture has been practised for above a century. Long before that time, internal incisions had been combined with the use of escharotics, although it does not appear that they were employed alone much before the period named. Allies of France (1755), Physick of Philadelphia (1795), John Bell (1806), Charles Bell (1807), Mc'Ghie (1823), and Stafford (1827), have

employed different instruments and different modes of performing internal incision. Modified forms of some of these have been occasionally adopted by modern Surgeons in this country; but the method has been practised much more extensively in France, where very numerous forms of urethrotome have been designed.

All belong to one of two classes: in the first, section is made by pushing downwards a lancet-like blade, generally with a slender conductor in advance of it, into the obstruction to be divided—incision from before backwards. In the second, a portion of the instrument containing a small blade, sheathed, is first carried through the stricture, which is divided by protruding the blade and drawing it outwards through the whole of the contracted portion—incision from behind forwards.

Incision from before backwards. When ever this mode is practised, a guide should previously be passed through the stricture into the bladder, to insure an accurate course for the blade: formerly incisions were made without any guide; a method now wholly discountenanced, on account of its uncertainty and danger. This proceeding has usually been considered more applicable to obstinate strictures which are situated within three or four inches of the external meatus, provided they are *not* greatly indurated, than to those which are more deeply placed, although it is quite possible, especially with modern instruments, to employ it for these also. It has not been greatly used in this country, but has of late come more into vogue abroad, from the recent employment of a fine flexible guide, which precedes the urethrotome in its passage through the stricture and is then pushed onwards into the bladder. The practical value of this method cannot be endorsed here: a better one, with a grooved guide, has been employed by Mr. Wood of King's College Hospital; and more lately a "catheter urethrotome" has been designed by the present writer, "the peculiarity of which is, that every step of the process is mechanically certain and safe, after a No. 2 silver catheter has been passed." The catheter having withdrawn the urine, and thus proved that the instrument is not in a false passage, the blade slides along it through the stricture, is then withdrawn, and a large gum catheter is passed over the small silver

Fig. 4.



A, silver catheter, size of No. 2, by which the urine is withdrawn. B is a rod of the same size, which screws into the end of the catheter. C is the urethrotome: *b* the blade sheathed; *d* the handle which unsheathes it. This instrument passes down a groove in A, and, after incising the stricture, is withdrawn; when E, a gum-elastie catheter, is passed into the bladder over the catheter and rod, AB.

catheter, which, being also withdrawn, concludes the operation (see fig. 4). This remains for twenty-four hours; and the subsequent treatment is the same as that described in the next section.

Incision from behind forwards. This mode of operating is for the most part more certain and effective than the preceding; and it is applicable equally to all parts of the canal. It requires generally, however, that the stricture should be dilated sufficiently beforehand to admit that part of the urethrotome which contains the blade to pass through and beyond, before the incision can be made; and this portion is necessarily equal in size to No. 3, 4, or 5. This preliminary dilatation is accomplished by the "continuous" process. It has often been objected, that if we can pass a No. 4 or 5 through a stricture, there can be no occasion to employ any cutting instrument at all. But such a remark is based on defective acquaintance with the subject. The indication for a cutting operation is not that the *stricture is of very small calibre, but that it is non-dilatable*; that is, that its calibre cannot be permanently increased by the most persevering and judicious application of instruments, or that so much fever and distress are produced by them as to counterbalance the benefit of any dilatation they may effect. Thus, a stricture may at the outset of treatment not admit even a No. 1 bougie, yet in a short time it may be easily dilated, and show only slight tendency to return, easily counteracted by occasionally passing an instrument; on the other hand, a stricture which habitually admits No. 6 or 7 may be the cause of the greatest suffering, of almost daily retention, and be irritated instead of benefited by all attempts to dilate. It is in such cases, happily not frequent, that incision has proved of very great service. I have rarely experienced better results from any operation than those obtained from internal urethrotomy in cases of the kind described.

Before employing any form of internal urethrotomy, it is necessary to have an accurate idea of the site and extent of the stricture to be divided; this is obtained by employing on two or three occasions a sound with a bulbous extremity, just large enough to pass through the contracted part (page 394).

I have employed by choice the urethrotome of Civiale.* In this instrument the blade lies concealed in the bulbous extremity, from which, by means of a simple contrivance in the upper end of the sheath or canula, it can be made to project one, two, three, or four degrees, according to the depth of the incision intended (see fig. 5). The mode of proceeding is as follows: having sufficiently dilated the stricture, so that it will admit about a No. 4 or 5 bougie, the situation and extent of the obstruction are ascertained by means of the urethrotome itself, the bulbous end of which forms a useful sound. The bulb is then carried about one-third of an inch, or a little more, beyond the stricture, the blade projected, and the incision made by drawing it slowly but firmly outwards—that is, in a direction towards the external meatus—to the distance of an inch and a half or two inches, generally towards the floor of the urethra, so as to incise fully the stricture and a little of the sound urethra before and behind it. Experience shows that hazard is not increased by the length of the incision, which should always be fully adequate to the purpose; but it is quite otherwise in the important particular of depth: this should never exceed the amount

Fig. 5.



Civiale's urethrotome.

* Various other methods and instruments have been devised, by Amussat, Leroy d'Etiolles, Sédillot, Maisonneuve, Ricord, Mercier, Reybard, Heurteloup, Bonnet, Boinet, and others; but it is deemed unnecessary to refer further to them here.

produced by about half the power of projection possessed by the instrument in question. After the operation, a full-sized elastic catheter is retained for twenty-four hours. During the first fortnight, a metallic sound is passed about every second day, taking care to press the convexity of the curve well downwards into the site of the wound, so as to keep the lips asunder, or at all events to extend the cicatrix. After this it is to be used every three days, every four, every week, and at last twice a month. Hæmorrhage to any considerable extent is rare; if it is free, a full-sized instrument in the urethra, and external cold, will stop it. Febrile symptoms occasionally show themselves after the operation, as in other modes of treatment, and disappear without remedial means. In relation to the accidents which may immediately follow the operation, the following is the result in upwards of twenty cases of urethrotomy performed by myself in the manner described. In those practised for stricture situated in the urethra in front of the scrotum, I have seen no ill effects whatever. In those practised in the bulbous part of the urethra, I have twice seen free but never dangerous hæmorrhage; and sometimes a smart attack of fever, but never abscess, extravasation of urine, inflammation of the bladder or kidneys, or pyæmia. Such occurrences may occasionally be met with doubtless, because any instrumental interference with the urethra—even the passing of a bougie—is apt in certain cases, happily very few in number, to give rise to these conditions. Indeed, no one who is experienced in the surgery of the urinary organs can question that such events must sometimes arise.

In relation to the positive benefits which are to be obtained, the immediate result is perfect. Properly incised, there is no longer the slightest grasp on the largest instrument introduced, and it is often difficult to recognise the seat of the former contraction.

In some cases these results are permanent; in others, the stricture shows a tendency to return; but as in external division, so in internal, the contractility and the nondilatability—those characters which have been before shown to be the indications for resort to operative procedure—are generally greatly diminished in intensity; and if subsequent treatment be necessary, dilatation usually suffices.

Such have been the general results of urethrotomy, when properly performed, and applied to suitable cases. I think it right, however, to add here, that my observation and experience of distension at a single sitting, or by rupture, have convinced me that the methods which have been practised by Mr. Holt and by myself (see pp. 398-9) will frequently supersede the necessity for internal incisions. The newer methods, however, are to a certain extent under trial; it has therefore been considered desirable to give sufficient prominence to the older operations, which have been largely practised, and which have been so useful in some of the most severe examples of the disease.

Incision is especially applicable to that not uncommon form of stricture which occurs at, or very near to, the orifice of the urethra. It may be congenital, the result of inflammation, of cicatrization after chancre, or other lesion there. It may be the only obstruction in the canal, and yet give rise to the most painful and serious symptoms, and even to a fatal result. I have repeatedly given complete relief to distressing symptoms, the cause of which was not suspected, by dividing an external meatus, which admitted nevertheless a No. 5 or 6 catheter. The incision may be performed with a director, and a straight, narrow-bladed bistoury; but the most efficient instrument is a small *bistouri caché*, which is passed through the contracted part of the canal; pressure being made on the handle, the blade is opened to an extent previously determined and arranged by means of the screw; it is then drawn out, with the edge turned towards the frænum, and the section is made. A piece of dry lint, introduced by the meatus for an inch and left there, stops the bleeding. After a day or two, the patient introduces for himself a short conical metal bougie, about three inches long, and provided with a handle sufficiently large to prevent its slipping into the urethra.

The late Mr. Colles, of Dublin, adopted a method of treating some of these cases which deserves notice. It consists in drawing over the surfaces divided by the section described the two edges of urethral mucous membrane, and

stitching them to the external margins of the wound, each lip of which is thus covered by membrane, and prevented from adhering to its fellow.

External urethrotomy. The division of the tissue composing the stricture is sometimes effected by incisions commenced from the external surface. Various external operations, although designed mainly to relieve retention of urine, were made at a very early period, according to Rhazes (10th century), and Avicenna (11th century). The earliest operation for the cure of stricture apart from retention, but in which the Surgeon could pass no catheter, is recorded by Wiseman (1652). A few years afterwards, Solingen, at Livourne, adopted a similar course. François Tolet and Colet (1690) appear to have performed similar operations in France. J. A. Petit and Ledran (1740) had recourse to them also, and more frequently perhaps than their predecessors. In 1783 John Hunter performed the operation now known, and described hereafter, as the perineal section; but it was rarely employed until Mr. Grainger of Birmingham advocated it, in 1815. He was followed by Mr. Arnott: since which time it has been the proceeding ordinarily adopted for the treatment of certain extremely obstinate and complicated cases, in which the Surgeon has found himself unable to pass any instrument whatever through the stricture. More recently (1844) Mr. Syme has advocated the division of the stricture for some exceptional cases, in which, *although a catheter can be passed into the bladder*, no other treatment has afforded sufficient or permanent relief. This operation he has called "external division," a term which should be reserved for his method; while it is equally desirable to limit the use of the term "perineal section" to the proceeding just referred to in connexion with strictures which have been found impervious to the catheter.

Perineal section will be first considered. This operation, or that without a guide, and employed only for so-called "impermeable" stricture, is much less frequently performed now than it was some few years ago. There is a growing belief, which has greatly influenced practice, that few, if any, strictures exist through which, if the urine issues externally, a catheter of appropriate size may not be passed in the course of time, with care, gentleness, and skill. When exception, however, does occur, and it is decided that the state of the patient is such as to require operative interference, the following operation may be performed. The stricture being situated in the bulbous portion of the urethra, the patient is placed on a table, in a good light, is secured as for lithotomy, and the perineum is shaved. A large catheter is to be passed as far down the urethra as the obstruction will permit, taking care that the instrument rests on the face of the stricture, and not in a false passage; an assistant holds it firmly, and draws the scrotum upward. An incision is made in the middle line of the perineum, along the raphé, from the base of the scrotum to near the margin of the anus, and the point of the catheter is to be exposed by deeper incisions. The sides of the opening are then to be held apart as widely as possible with hooks, or by some other means, so as to give a clear view of the urethra and of the contracted opening. This done, the operator, who should be provided with grooved directors of the smallest size, endeavours to carry one of them through the contraction, and if he is successful, the division may be made with ease and safety. He may not be able to pass the director more than two or three lines, until, having made a careful division so far, he may be enabled again to follow the track of the contracted canal, and to divide another portion of it upon the instrument. But if a director cannot be introduced, he must endeavour by dissection to follow the urethral canal as closely as possible. In either case, as soon as the continuity of the passage is restored, the catheter first employed is to be carried onwards into the bladder, secured in the usual manner, and retained for some days.

External division. This proceeding consists in first passing a slender grooved steel sound through the stricture into the bladder, and in cutting down from the external surface to it, so as to divide entirely the stricture; then a large catheter is tied-in for forty-eight hours, and dilatation maintained at intervals afterwards.

The following are the details to be attended to in performing the operation:

First, a clear idea of the precise situation and extent of the stricture must be formed before commencing. Next, the patient being placed as for lithotomy, a staff, the lower half of which is slender and grooved, and the upper of full size, is passed so that the shoulder or edge of the thick portion rests firmly against the face of the stricture, the slender part passing through it into the bladder. An assistant holds the staff in his right, and draws up the scrotum with the left, hand. The operator makes an incision in the line of the raphé from above downwards, about two inches long, and steadily follows the direction of the median line, through the structures intervening between the skin and the staff, until he can distinguish the shoulder of the staff, and by that is guided to the position of the stricture, when, taking a sharp straight history in his right hand, and the staff itself in his left, he engages the point of the knife in the groove of the staff, about an inch below the shoulder, and cuts upwards, dividing the tissues, to the upper end of the groove. If the stricture has been properly divided, the shoulder of the staff may be passed downwards through the incised part with ease, and if so, is withdrawn, and a catheter passed in its place. Since, however, the point of a catheter sometimes catches in the wound, and does not go readily into the bladder, perhaps from the urethra occasionally collapsing at the posterior limit of the incision, I prefer to introduce by the wound, before withdrawing the staff, a concave curved director along the convexity of the staff, on which the catheter glides securely and certainly into the bladder. If the catheter, however (which should not be smaller than No. 10), be obstructed at any point, and be obviously grasped after it has been passed, it is certain that some fibres still require division, and these should be at once incised.

At the end of forty-eight hours the catheter is to be withdrawn; and generally about three days after a full-sized sound should be passed. Mr. Syme likes to guard the wound from contact with urine as much as possible, by introducing a tube from the wound to the bladder, and leaving it there, as after lithotomy; and he employs, in that situation, one with a double curve, and about nine inches long, instead of the catheter, which he dispenses with altogether at first. Subsequently the catheter is passed every three or four days for a time, then once a week, then once a fortnight, and finally once a month; and the practice may be continued if any disposition to contract appears; but if otherwise, it is necessary only to make a trial of it from time to time.

Mr. Syme lays stress upon the importance of attending to the following particulars, which I add briefly here: 1. Maintain the median line in the incisions. 2. Make a direct opening down to the staff, not a tortuous one. 3. Divide the whole of the contracted part, rather more than less. 4. Do not cut so far back as to endanger the deep fascia of the perineum, and use the knife in the deep incisions with the cutting edge uppermost. 5. Do not close the end of the inlying catheter, lest urine be forced into or through the wound, for want of patency in the instrument. 6. Avoid escape or displacement of the instrument. 7. If incisions are made far back, introduce a curved tube through the wound when the catheter is withdrawn. 8. Do not neglect dilatation during the progress of recovery.

Results of treatment by external incisions. In reference to the operation without a guide, or the perineal section, the best that can be said of it is, that it is a hazardous proceeding, and no Surgeon should entertain the idea of performing it except after thoroughly assuring himself that the stricture cannot be rendered permeable to instruments, and so made amenable to other modes of treatment. In a few cases the operation is performed successfully, but in most there can be little doubt that the route of the stricture itself is not followed, and that the knife makes a new channel through adjacent and often very unsound tissues, very inadequate to perform subsequently the function of a urethra. In many instances the attempt to make a channel to the bladder has wholly failed, and the patient has been removed from the operating-table unrelieved; and in not a few the result of the proceeding has been fatal. This termination, however, is to be anticipated in a large proportion of what must necessarily be the worst cases of their kind. Such views of this operation tend to impress us more strongly with the conviction, that every chance of getting an instrument through

the dilated urethra by protracted but gentle endeavours, combined with rest and constitutional treatment, should be exhausted, before we consent to resort to perineal section.

Respecting the operation of external division, or that performed on a grooved staff, it will be remembered that it is applicable only to cases which present either an insuperable tendency to contract after dilatation, or a condition in which bougies are incapable of dilating, or an extreme irritability on the part of the stricture, rendering any prolonged mechanical treatment futile or impossible.

These conditions are well and satisfactorily treated in some cases by internal division and by rupture; those instances, for example, in which the constricting nondilatable tissue is manifestly not considerable in quantity, and can be divided by means of an internal incision of moderate depth, or overcome by distending instruments. Where, however, the stricture consists of a large amount of morbid tissue, with much induration, perhaps involving the whole thickness of the corpus spongiosum,—a condition usually appreciable to the finger externally applied, more especially if fistulæ, either chronic or numerous, coexist,—the operation of external division is generally the most suitable for the case. It is therefore considered here as applicable only in exceptional cases; and in these, where it is properly performed, and followed by careful management, excellent results are frequently produced. I have observed such in my own practice for cases which I believe could not have been materially benefited by any other proceeding.

After a careful observation of a very large number of cases so treated, there is ground for speaking with some degree of certainty respecting the immediate and remote results of this operation. Among 219 cases, collected with scrupulous care by myself, there was a mortality of between 6 and 7 per cent. Of this percentage nearly two-thirds died of pyæmia, the remainder (one or two only excepted) from fever and suppression of urine. Such a mortality is by no means large when we consider what kind of subjects selected bad cases of stricture are, especially as they occur in hospital practice, by which most of this series was furnished.

Hæmorrhage, to a moderate but not dangerous extent, not unfrequently occurs either at or after the operation. Very rarely is it serious; and when it is, there ought not to be difficulty in stopping it. A full-sized catheter being in the urethra, it is necessary to plug the wound with lint, and maintain a firm pad of the same material over it, by means of a **T**-bandage closely applied. In one case in which I operated, the perineum being greatly indurated with several fistulæ, there was obstinate bleeding from vessels which the ligature would not hold, owing to the nature of the tissue in which their mouths were embedded; but I succeeded in stopping it by carrying a small curved needle beneath each bleeding point. In regard to the important question of remote results from this operation, there have been some few cases undoubtedly in which it has failed to be successful; in a much larger proportion, more or less of recontraction appears after the lapse of time. This has sometimes arisen from want of care to divide the entire contracted portion of the urethra; in other cases, from neglect of subsequent dilatation. On the other hand, in some cases, I can personally vouch for the fact that no narrowing has appeared seven years after the operation. In most, I believe, it will be always necessary, or at all events prudent, to maintain some dilatation afterwards; the condition usually obtained being a dilatable urethra, in the place of a nondilatable and obstinate stricture.

Spasmodic stricture. It is extremely rare that any considerable narrowing of the urethra takes place as the result of pure spasm of the muscles surrounding the passage. Granted, however, the presence of organic narrowing, or of inflammation in the canal, and an undue action of the urethral muscles may be excited, so as still further to narrow it. There is no doubt that a slight degree of this action may be excited in any part of the passage; but it certainly

becomes more obvious in the membranous part, where sphincteric muscles exist in addition to those unstriped fibres which surround the canal throughout the whole of its course. Nevertheless the existence of "spasm" is very constantly and very frequently affirmed, often without any proof of its presence, and usually in order to account for unsuccessful catheterism. Organic difficulties are quite sufficient without it, in many bad cases, to baffle at times the most experienced and most dexterous operator.

But spasm does often exert some influence, when the cause of irritation preëxists in the canal itself; very rarely it may do so when the cause is not there, but is situated remotely. Of the first-named fact the following are instances: the presence of organic stricture; of inflammation from repressed gonorrhœal discharge; irritation of the mucous membrane from highly acid, and occasionally from acrid, urine; from foreign matters ingested, and expelled by the urine, as cantharides, turpentine, and perhaps some forms of condiments and of alcoholic drinks; and from voluntary retention of urine exerted during too long a period of time. Examples of more remote causes of spasm are rectal irritations, as hæmorrhoids, fissure, prolapsus, fistulæ, operations in the rectum, ascarides, prurigo about the anus, derangements of the digestive apparatus and of the cerebro-spinal system. But it is important to remember that the distinguishing feature which marks the phenomena thus ascribed to irregular muscular contraction, and by which they are contrasted with those of organic stricture, is their transitory character. The symptoms of a narrowed urethra may repeatedly occur, but the canal ordinarily possesses its natural degree of patency. This is never the case in the presence of organic stricture; the stream then varies, but it never attains the natural size.

In treating spasmodic stricture, general principles must be kept in view, and applied according to the particular requirements of each case. Local treatment of the urethra itself is often of secondary importance, sometimes, indeed, prejudicial. The main thing, as in all spasmodic affections, is not to regard so much the sign or symptom itself as to investigate the cause, a correct appreciation of which is the only key to successful treatment. This must be carefully sought, not only in the urinary tract, but in adjacent and allied organs, and in the condition of the system at large. Speaking in general terms, it will be found that attention directed to the condition of the animal powers, to the improvement of the secretions, and to the regulation of the regimen and habits of the patient, will conduce more to the removal of the local symptoms than any measures apparently of more direct or special application.

If any degree of organic stricture coexists, it is essential to treat this in the usual way; but as far as the complication of spasm is concerned, the treatment consists in obviating all sources of derangement which can be discovered as likely to influence the condition of the local disease.

I have known a single instance of spasmodic retention to occur periodically, and to disappear before the use of quinine: Sir B. Brodie records one similar

case. A very hot hip-bath, a cupping on the perineum, or the inhalation of chloroform, may sometimes give instant relief. For the most part, however, spasmodic action in the urethra is associated with inflammation affecting a part or the whole of the canal, and especially when inducing retention of urine. Any further notice of its treatment will therefore be referred to the management of that condition. (See Retention of Urine, p. 416.)

Inflammatory stricture. As in the preceding example of spasmodic stricture, the term here employed rather designates a condition liable to affect and intensify a preëxisting organic stricture, than a separate and independent lesion. Retention of urine is undoubtedly caused by inflammation of the urethra; but this is by no means inflammatory stricture in any sense in which the term can be logically employed; the pathological condition usually present in such cases is acute inflammation of the prostate, with swelling of that gland (see p. 362). Nevertheless the term has been so generally accepted to describe an attack of painful and difficult micturition resulting from inflammation attacking a urethra already affected with some organic constriction, that for the present it seems desirable still to employ it. The patient complains of heat, fulness, and tenderness in the perineum; the passing of the urine is exquisitely painful; the stream narrows rapidly during the act of passing it, and ceases before the bladder is emptied or the desire diminishes. Usually it is found on inquiry that a recent purulent discharge from the urethra has been suddenly checked by external cold or wet; the signs of inflammatory fever are usually present. As this condition almost invariably comes under the Surgeon's notice for relief of retention of urine, the subject of treatment will be considered in the section devoted to that condition resulting from acute prostatitis.

Tumours in the urethra. The cause of urinary obstruction was formerly supposed, in nearly all cases, to be the existence of "carcinomas" or "caruncles" growing from the mucous membrane of the urethra. Such bodies do exist, but they are excessively rare.

Pascal (1718) describes two cases of numerous small fungoid excrescences obstructing the urethra. Morgagni (1761), in his forty-second letter, speaks of one which he had seen among many examinations. Arnaud (1769) names three instances. Hunter met with two cases; one is in the Museum of the Royal College of Surgeons. Sir Charles Bell describes and figures two cases. Amussat, Civiale, Lallemand, Ricord, Chelius, Leroy, and Mercier, all describe occasional cases met with in their own individual experiences. Guthrie and others in this country have met with a case occasionally. A good specimen exists in the Museum of Guy's Hospi-

tal of polypoid growth springing from the mucous membrane of the membranous portion. I have myself met with a good example of small polypus springing from the verumontanum, in a man, aged 54 years, a patient in the St. Marylebone Infirmary. The only sign of its existence, which could be ascertained during life, was an increased frequency of micturition. Those which are found at the anterior part of the canal, and which appear almost confined, as regards situation, to the fossa navicularis, are usually soft, of a rose-red colour, bleed very readily, and are not very sensitive. Their close proximity to the erectile tissues beneath may be reasonably supposed to be the cause of their peculiar vascularity. That they are, but more rarely, to be found in the posterior parts of the canal, is proved by some of the preparations referred to. On the other hand, almost all the specimens of the polypoid growths which I have seen are confined to the prostatic portion, and are sometimes accompanied by others at the neck of the bladder or within it, to which latter, indeed, they then have the appearance of being secondary formations, and they are more frequently found affecting only the lining of the bladder, and not that of the urethra at all. In such cases their structure amounts to little more than hypertrophy of the mucous membrane.

The conclusions to be drawn from the facts known respecting growths into the urethral canal are :

First, that the existence of any excrescence so large as to attract observation as an independent growth in the urethra is extremely rare.

Secondly, that these bodies consist either of (a) *vascular granulations* ; (b) *polypoid formations* peculiar to the prostatic part of the urethra ; or (c) masses of *tubercular* and *cancerous* origin.

Lastly, that tubercular and cancerous deposits are rarely primary in the urethra, but are mostly secondary to disease of the kidney, bladder, or prostate, and rarely appear until the primary disease has been developed to a formidable extent elsewhere.

Urinary abscess—most frequently a result of obstruction in the urethral canal—may be regarded in reference to its situation as penile or ante-scrotal, scrotal, perineal, and intra-pelvic. Among these the perineal is the most common, next comes the scrotal ; the intra-pelvic occurs usually in very advanced cases of stricture, &c., in which a fatal result is impending, and also as a consequence of operations ; and the penile is rare, most frequently being caused by gonorrhoeal inflammation of the urethra.

Occasionally, but by no means commonly, urinary abscess in

the perineum may be met with, when there is no obstruction in any part of the urethra. When this is the case, there is some ground for suspecting that disease exists at or near the neck of the bladder, particularly disease of the prostate. In chronic suppurative disease of that organ, perineal abscess sometimes appears.

Ordinary urinary abscess in the perineum may be acute or chronic: the former usually requires prompt interference on the part of the Surgeon, and its presence is often indicated by constitutional symptoms before local evidence appears of a marked character. If these are severe, and there are also tension, fulness, and tenderness in the perineum, a free and deep incision made in the middle line will often give instant relief; and if matter is not seen at once, such a proceeding will do no harm, although nothing else result but a little bleeding, and the relief of tension. No considerable hæmorrhage need be feared, although sometimes, when there has been much inflammation in the part, a smartish trickling may continue for some little time. When it has ceased, a poultice should be applied to the wound. Great improvement in the patient's condition often takes place almost immediately; the fever subsides, and complete recovery may follow in a very short time.

The importance of speedily evacuating such collections of matter, even at the commencement of their formation, cannot be overrated. Matter pent up behind the deep perineal fasciæ which forms a partition too dense to be penetrated by the action of absorption, will find its way into the cellular tissue of the pelvis, by the side of the bladder, between it and the rectum, and give rise to dangerous consequences, or, in event of recovery, to urethro-rectal or vesico-rectal fistulæ. Otherwise it may burst into the urethra, and be discharged by the external meatus. The collection having been opened, pus in some quantity escapes, usually alone, sometimes mixed with urine, but not necessarily so. One of the main objects in making an early opening into a collection of matter in the perineum, is to prevent the occurrence of any lesion of the urethral walls; if its evacuation be soon and fully insured, we may hope to find the cavity gradually closing, and that no urine will penetrate it, when there will be less fear of its remaining long open, or of its becoming an abnormal passage for the urine.

In the case of chronic abscess, it is desirable that an incision should be made when the presence of matter is perfectly evident. These abscesses are usually situated in the neighbourhood of the bulbous portion of the urethra, and appear in the perineum and scrotum; sometimes as the result of a little ulceration behind the stricture, and escape of a drop or two of urine into the cellular tissue; often, perhaps, from the adjacent irritation, without having any direct communication at first with the urethra. This communication almost invariably takes place if the abscess breaks off itself, sometimes when it is opened by the lancet; but generally no urine appears when it is opened early, until some days after the operation, and occasionally not at all. An unnatural opening, however, having been established, the frequent passage of the urine through it, which must occur at each act of micturition if the stricture be narrow, prevents its closure. This artificial canal, usually termed urinary fistula, is one of the common accompaniments of neglected stricture, and often forms a troublesome complication.

Urinary fistulæ. The external openings of these passages are most commonly seen in the perineum and scrotum, which are traversed by them in various, and often by circuitous, routes; less frequently they are observed in the groins, the upper part of the thighs, the adjacent part of the nates, or even above the pubic symphysis. In the last-named situation, the devious channel usually results from incisions made to relieve extravasation; but in the scrotum or perineum it is generally due to a previously-existing urinary abscess.

Under the term 'urinary fistulæ' all these conditions are commonly included; some of them simple, and easily amenable to treatment; others complicated, and requiring much care and time in order to attain a successful result. Some are merely narrow channels through nearly healthy parts; others pass through structures indurated and deformed by repeated deposits of plastic matter, and sometimes connected with cavities secreting pus, and detaining in their interior some quantity of the urinary secretion. The external orifices of the fistulous passage may be few or numerous; in the latter case being the outlets of sinuous channels springing from the original track, and giving exit to a number of small streams when the act of micturition is performed. And lastly, besides the foregoing, there are those openings into the urethra which have their origin in loss of substance by sloughing from extravasation, phagedænic ulceration, or violent injury to the parts; and these abnormal conditions are distinct in their nature from the two preceding classes. This mode of arranging the numerous and widely-differing lesions comprehended under the general term urinary fistulæ, indicates three forms of morbid condition, each requiring appropriate treatment.

1. *Simple fistulæ.* The first class embraces those cases where, in connexion with stricture of the urethra, one or more fistulous passages exist, the surrounding parts being not much altered from their natural or healthy condition. These openings are the result of nature's mode of affording relief in cases of narrow stricture; they act as safety-valves to the pressure exerted upon important organs behind the obstruction. Thus we often see patients enjoying fair health and comfort, notwithstanding large fistulous passages in the perineum, by which all their urine is passed. But the annoyance, sometimes the pain, besides the tendency to grow worse, which accompany urinary fistula, to say nothing of considerations arising in relation to the sexual function, demand the interference of the Surgeon to bring about a natural state of things.

For these cases, as a rule, nothing else is required than to dilate fully the urethra. The urine will flow by the natural channel, and the fistulæ will heal of themselves, if we insure a free passage from the bladder. Those patients who form the exceptional instances to this rule are for the most part weak in constitution, have little reparative power, or are subjects of some chronic disease in addition to stricture of the urethra. The management of these is mostly that of the next class.

2. Cases in which the fistulæ pass through tissues indurated and deformed by inflammatory exudation.

In these cases also, the primary object is to dilate adequately the stricture, and to observe the effect induced. In some of them it is sufficient to enable the fistulous passages to heal slowly. Dilatation, however, having been maintained for some time, and little or no benefit having resulted, it will be desirable either to stimulate the walls of the fistulæ themselves, and so bring about adhesion of opposing surfaces; or to lay them open, in order to produce recent and healthy wounds, so that they may heal up soundly from the bottom. At the same time we must attend closely to the patient's general health, seeking to maintain the secretions in a natural condition. Various agents have been employed to stimulate the indolent fistulæ; one of the best is the concentrated tincture of cantharides, applied on a camel's-hair brush, or with a fine syringe. Solutions of the sulphate of zinc or copper, and of the nitrate of silver, injected by the syringe, sometimes give good results. An excellent mode is to introduce carefully, as far as possible, a small and flexible silver probe, coated with nitrate of silver; a plain probe having been introduced beforehand as a guide to the length and direction of the passage. It often happens that the external orifice of the sinus is smaller than any other part: in such a case, a little caustic potash should be applied for the purpose of enlarging it, and so permitting free removal of the discharge.

The application of compression to the fistulæ has been tried several times, and success has been claimed for it in two or three cases; in one of which, all ordinary means having failed, a cure was obtained by making the patient apply firmly to the perineum an india-rubber ball, inflated with air, on every occasion before making water, and for some minutes afterwards. This plan was studiously followed during fifteen days, when the opening had soundly cicatrised. Four months after, the patient was perfectly well.

The cure of obstinate urinary fistula has also been attempted by introducing a catheter, and permitting it to remain in the urethra for days together, on the principle of insuring, as it has been supposed, the passage of the urine through the instrument, and thus preserving from irritation the fistulous passages. Little, however, is thus gained; for experience shows, that however large the instrument may be, and however closely it may fit the urethra at the present moment, before thirty-six hours have elapsed it will lie loosely in the canal, and urine will pass by its side. It is not possible, indeed, to remove urine from the bladder for any lengthened period by this means without inducing suppuration in the urethra, which is a bar to success.

It is better to withdraw all the patient's urine, by introducing a catheter three or four times a day, or more frequently if necessary. When the patient can do this cleverly for himself, and thus insure, at every want to pass urine during a period of several weeks, that it is carefully removed without contact with the urethra, a most successful result may be hoped for. I have had an instance of this under my own care, where, a large portion of the floor of the urethra being lost, the opening closed after three or four months' attention to this practice.

Free incisions through the fistulæ, down to their origin in the urethra, or nearly so, have been found successful in inducing a healthy process of granulation from the bottom of the wound, and thus in ultimately closing the unnatural passages; provided always, however, that there is no obstruction to the free egress of the urine by the urethra, otherwise no such measure can be of any

service. In some cases in which external division of the stricture on a grooved staff is indicated, this operation may be performed in such a manner as to include the fistulous opening in the incision, in which case a successful result may generally be reckoned on. Old chronic perineal fistulæ are sometimes better dealt with by the galvanic cautery than by any other method. Another obstinate species of fistulous passage, communicating with the prostatic urethra, sometimes follows the operation of lithotomy; this also may be often successfully treated by the introduction of an iron wire heated to intensity; the best means of effecting which is undoubtedly the galvanic current, since it maintains as well as produces the required temperature.

A fistulous passage is sometimes prevented from closing by the presence of a small calculus in some part of its course. It may be a small concretion which has escaped from the bladder, or a deposit from unhealthy urine while passing through the sinus. Sometimes it occurs in fistula connected with diseased prostate, or with a prostate which is the subject of calcareous formations. Fistula associated with the prostate may, however, exist in the absence of any of these causes; such as those which are sometimes connected with prostatic abscess, and which are generally exceedingly obstinate and irremediable.

Fistula is not necessarily a continuous passage from the urethra to the surface; opening from the urethra at one end, it may have a blind or cæcal extremity: hence "blind urinary fistula" has been described. A small tumour, originally formed by a collection of matter, and having a communication with the urethra, constitutes the general form. Its origin has been variously accounted for; some believing it a result of stricture, others of inflammation of the mucous follicles of the urethra. Until the tumour is opened externally, it will not disappear, when it becomes a fistula of the ordinary kind, requiring treatment already indicated.

Urethro-rectal fistulæ sometimes occur as a consequence of stricture or abscess, and more rarely, perhaps, vesico-rectal. In either case their existence is usually first announced by the passage of liquid in an unusual manner and quantity by the anus; sometimes by the appearance of feculent matter in the urine or by the urethra.

I have recently treated a case of urethro-rectal fistula in a gentleman of about twenty years of age, in whom it resulted from acute prostatic abscess following gonorrhœa. The urine passed freely by the anus for some weeks: after trying various means, the use of the catheter, &c., without success, I discovered that by placing him flat on his face during the action of micturition, almost all the urine passed by the urethra. This plan was uniformly adopted for three months. Urine ceased to pass altogether by rectum in a month, and in two more he could pass it in the upright position without any escape. The fistula has remained soundly healed ever since. If such a plan does not succeed, the actual cautery, and particularly that heated by the galvanic current, affords the best chance of success. It may be applied through the rectum; a speculum having been first introduced, and a full-sized sound carried into the bladder. On the day

before the operation the bowels are to be freely purged, and cleared by an enema an hour or two before the application of the cautery, after which they must be prevented from acting for two or three days. The cautery is to be re-applied two or three times if necessary. If the opening is large, the edges should be pared and brought together by silver sutures, after the method of Dr. Marion Sims.

The third class of urinary fistulæ comprehends those unnatural openings into the urethra depending upon actual destruction of substance from the walls of the urethra and superjacent parts. The common causes of these are, sloughing from extravasation of urine, simple and phagedænic ulceration, and mechanical injuries of various kinds. They are for the most part larger, although not invariably so, than any of those already referred to. Generally a portion of the floor of the urethra is destroyed, as well as the structures which have intervened between it and the external surface; so that in many cases more or less of the mucous membrane of the upper aspect of the canal is visible from the outer orifice. As a consequence, the whole, or nearly the whole, of the urine passes by the artificial channel in a full stream. Such apertures may be found before the scrotum, and are called ante-scrotal or urethro-penal fistulæ; or in or behind the scrotum, known simply as scrotal and perineal fistulæ.

A broad distinction exists between these two classes in relation to their amenability to treatment, and to the nature of the operations necessary to their cure. Ante-scrotal urethral openings are the most difficult to close, since the coverings of the urethra here possess but little substance. And further, owing to the extreme mobility of the member, and its liability to erection, it is difficult to maintain that perfect steadiness of position so desirable in a part which is the subject of an autoplasmic operation. Nevertheless, with all these difficulties, in addition to that formidable one the contact of urine, such openings, even when large, are not to be regarded as beyond the reach of surgical skill. The exercise of considerable patience, and of unremitting attention during a long period, is indispensable both to the Surgeon and to the patient in a case of penile fistula requiring a plastic procedure for its cure.

Openings in the perineum involving loss of substance, although by no means easy to close, are remediable with less difficulty, on account of the absence of conditions just adverted to as the obstacles in ante-scrotal fistulæ.

Treatment. Ante-scrotal fistulous openings which are of small size, but obviously depending upon loss of substance in some degree, have been closed by repeated applications of a caustic agent to their edges and to the surrounding parts. Of these the nitric acid, the nitrate of silver, or the strong tincture of cantharides, have been successfully employed in very small openings.

Dieffenbaech used the cantharides, and sometimes combined with it what he called "the lace suture." This he describes as applicable to small fistulæ in the anterior part of the canal. The margin of the fistula and the surrounding skin must be frequently touched during the day previous to the operation with the strong tincture of cantharides. Before using the suture, the loose epidermis is to be removed by scraping, and a sound introduced into the urethra beyond the opening. The operator is then to take "a small curved needle, sharp at the point, but not at its edges, with a stout silk waxed thread, and by means of a needle-holder to introduce it beneath the skin at about three lines from the border of the fistula." The point of the needle is to be carried deeply, but not into the urethra, and made to emerge at another point, about three lines from the margin of the fistulous opening. By three or four of these stitches, the thread is to be carried round the opening, until it finally emerges at the point at which the needle was originally entered. The thread is embedded in the cellular tissue around the fistula, at about three or four lines' distance from it. Its ends are now to be drawn together slowly, so as gradually to approximate the borders of the fistulous orifice until it is obliterated, and then to be fastened by a knot. In three or four days the ligature may be divided and drawn away. Most commonly, however, some plastic operation is necessary for these openings. The proceedings of Cooper and Earle, the first on record, are the basis of many various proceedings since employed. Space does not admit of the necessary description here. Two of the modes employed for ante-scrotal opening are described in the present work at vol. iii. p. 128: I have given others in the 2d edition of my own work on Stricture and Perineal Fistulæ in some detail.

Retention of urine. By this term is generally understood a condition in which the patient is unable to pass any urine whatever, or only an extremely small quantity; and is in danger of serious consequences if not relieved at no distant period. Urine may be, and often is, habitually retained in the bladder, while the patient nevertheless passes as much in the twenty-four hours as the kidneys furnish, the reservoir remaining more or less filled. This is engorgement of the bladder, and is not retention, which term is held to indicate an acute and not a chronic condition.

Retention of urine may be caused by simple prostatitis, usually occurring in young and middle-aged subjects; by stricture of the urethra, usually in middle life; and by hypertrophied prostate, in elderly persons only.

The consideration of the first and second forms will come next in order here.

Complete retention. When any degree of organic stricture exists, however slight, retention of urine is always possible if exposure to the influences of certain exciting causes takes place. Occlusion of the passage may be caused by inflammatory engorgement, or unwonted muscular contraction; more frequently, perhaps, by a combination of both. Sometimes it may be caused by a foreign body, as a small calculus, a portion of a membrane, or the like, obstructing the stricture; and this is probably the rarest form.

In treating retention, the catheter is the first, and often the only means required in nine cases out of ten. The first point to be ascertained is, is it a case

of merely temporary obstruction from inflammation following gonorrhœa, or does it depend on organic stricture of some standing? The next points are the duration of the attack and the condition of the bladder, bearing in mind that while some may exhibit distension of that viscus almost to the umbilicus, the subject of an old stricture may be in a state of greater danger, although no distension is perceptible above the pubes, owing to the contracted condition of the bladder, which has become natural to him. The treatment varies somewhat in the two cases just briefly described. In the first case, or that of temporary inflammatory obstruction, it has been recommended to employ baths, opium, and depletion before using the catheter; and relief may certainly be afforded in this manner, although at the expense of prolonged suffering to the patient. The object of this plan is to avoid injury to the urethra in its inflamed condition; and if the Surgeon is not gentle, or is not skilled in the use of the catheter, it is probably the safest course to follow. But if he employs a light and careful hand, a catheter of rather small size, say No. 4 or 5, of gum-elastic or silver, the former producing less pain, should be at once passed into the bladder; and in these cases this is generally easily accomplished, if the flexible instrument retains a good curve after the stilet is withdrawn. If the Surgeon does not succeed in passing an instrument, the patient should be put into a hot bath 100° to 103° or 104° , to relax spasm and relieve internal congestion; a full dose of opium should be given by the mouth; and if there is much straining, an enema or suppository containing opium may be also administered with advantage.

If there is much inflammation about the parts, as shown by a swollen penis, urethral discharge, and tender perineum, cupping or a dozen leeches on the latter region are decidedly useful, in the event of retention persisting; generally, however, some relief follows the use of the bath and the opium, which latter may be repeated two or three times, to insure its full action on the system. There are very few cases among those here regarded as inflammatory or spasmodic that will not yield; sometimes slowly without further catheterism, sometimes by means of an instrument, which may often be passed with comparative ease after the treatment described.

There are some instances where the difficulty seems more spasmodic than inflammatory, in which repeated doses of the tinct. ferri sesquichl., that is to say 15 or 20 minims every quarter of an hour, administered four or six times, relieve the retention. When, on the other hand, we have to deal with retention resulting from confirmed organic stricture, it is better at once to examine the urethra in the usual way, that is, with a full-sized instrument; and, having ascertained the locality of the obstruction, patiently to devote a long time to the careful use of the smallest catheters, silver and gum. In relation to its management, see pp. 396, 397, on Catheterism in difficult cases. If this proves unsuccessful, the hot bath must be resorted to; and after faintness has been induced, the catheter may be again employed while the patient is still in the bath.

Further treatment, if necessary, must depend upon the condition of the patient. Generally, opium should be given by enema and by mouth, after which the catheter is again to be used. The time which is to be devoted to the employment of all these means must be regulated by the judgment of the Surgeon. The condition of the patient, and a knowledge of the time during which absolute retention has existed, will enable him to decide the question of affording relief by some other measures. Chloroform is an agent of great value in obstinate retention. It relaxes the muscles; by causing insensibility it overcomes involuntary resistance and straining, and thus enables the Surgeon to use the catheter with greater advantage, although not with more force than without its influence.

But supposing none of the treatment hitherto employed has been successful, that the patient's condition is urgent, the next proceeding is to afford relief by making an artificial opening either into the bladder or the urethra.

To effect this, the following operations are employed:

The stricture may be "forced;" or, the urethra may be opened at or behind

the stricture; and the bladder may be punctured, either by the rectum, above the pubes, or through the pubic symphysis.

1. The first method, or "forcing" a stricture, is rarely performed now with deliberate intention. It consists in driving a catheter of moderate size forcibly through the obstacles which oppose its course, in the direction of the bladder, which when reached is evacuated, and the instrument is tied in. I have seen it successful in old, hard strictures. But it is not a proceeding which can be recommended in competition with those less harsh and dangerous proceedings which are generally practised by modern Surgeons.

2. The urethra may be opened, first, by a dissection from the surface to the stricture, and through it, according to the method already described as perineal section (p. 405); secondly, the urethra may be opened behind the stricture, the bladder relieved, and the obstruction divided subsequently. Both these are difficult operations. Especially when the perineum is thickened and indurated, it is by no means always certainly possible to dissect through the stricture from the front, or to hit the urethra behind the obstruction. The perineal section, under such circumstances, often fails to trace the narrowed channel, and sometimes even to discover the urethra at all; and a prolonged operation, with much loss of blood, not unfrequently results in failure to relieve the patient.

The method of opening the urethra by an incision made altogether behind the stricture was recommended in this country by Guthrie and Liston, but is very rarely performed, the puncture of the bladder per rectum being now generally preferred. The operation is performed by introducing the left forefinger into the rectum, to distinguish the apex of the prostate, and entering a straight sharp-pointed bistoury with the right hand just in front of the anus, so as to hit upon the urethra at the point indicated by the finger in the rectum. The knife is carried upwards exactly in the median line, so as to make an incision of one or two inches in length. In this manner the urethra is to be sought, and the stricture afterwards divided forwards or not, as the operator determines to be most desirable.

3. The bladder may be punctured in two principal ways, viz. by the rectum, and above the pubes; to which may be added a third, through the pubic symphysis. Formerly it was also punctured by a direct stab from the perineum; a dangerous proceeding, now wholly obsolete.

Puncture by the rectum is the operation most commonly adopted at the present day. Its results have been carefully studied of late years, and have been brought before the profession more prominently by Mr. Cock, who has done much to test its value. The result of his conclusions is, that it is fraught with less danger, and is more easy of performance, than any other which is adopted for the relief of retention. The objections made to it are: the liability to abscess between the rectum and the bladder; a persistent fistulous opening there; injury to the seminal vesicles, leading to suppuration of the testicle; and the danger of perforating the peritoneum with the trocar, and thus inducing inflammation of that membrane and a fatal result. The last-named, and the most serious, of these accidents is happily that which may most easily be avoided. After an examination of several cases by dissection, it is my opinion that the peritoneum is out of reach of the trocar when employed with a moderate degree of care. The puncture usually falls short of the peritoneal pouch by an inch at least. The other results do occasionally, but only rarely, occur.

The operation is thus performed: The rectum being emptied by an enema, the patient is placed in the position for lithotomy, and firmly held by two assistants. The operator then introduces the left forefinger, oiled, into the rectum, and defines the posterior margin of the prostate, beyond which the finger should be extended if possible. Fluctuation should be obtained there, from the contents of the bladder, by a tap made on the hypogastric region, unless the viscus be very contracted indeed, in which case the propriety of operating is doubtful, since the trocar may enter the opposite coat of the bladder, from absence of the requisite amount of distension. Having determined the spot at which fluctuation is most distinct, and directed an assistant to place a hand on each side of the supra-pubic region to support the bladder, a well-curved trocar, seven or eight

inches long, is carried along the finger in the middle line to the part indicated, the handle well depressed, and the point carried through the coats of the rectum and bladder, until it is felt free in the cavity of the latter. The stilet is withdrawn, and the canula retained by means of a bandage and tapes. The length of time it should be allowed to remain will depend on the amenability of the stricture to treatment. If this yields, the urine will most readily pass through the natural channel, and the opening in the rectum will readily close. Little fear need be entertained of the continuance of a fistulous opening; for on several occasions on which the canula has escaped by accident, it has been impossible to replace it, and a fresh puncture has been necessary. When it is impossible to find fluctuation by the rectum, or when the prostate is enormously enlarged, this operation, as a rule, is not to be employed.

Puncture of the bladder above the pubes is performed as follows: The patient being placed in a half-reclining position, and the pubes shaved, a vertical incision of the integument is made directly above the symphysis pubis, about an inch and a half or two inches in length at the surface; this is to be carried downwards through the linea alba, so as just to admit the tip of the finger to reach the distended bladder. Meantime an assistant, standing behind the patient, places one of his hands on either side against the abdominal walls, so as to steady the bladder. A straight or a slightly-curved trocar (if the latter, the convexity of the curve should be upwards) is then to be carried with a very little inclination downwards into the bladder. After the operation the canula should be exchanged for a silver tube, specially adapted to slide through it, secured by tapes and a T-bandage, which may remain a day or two until lymph has been effused upon the edges of the wound, when it may be withdrawn, and an elastic gum catheter worn in its place, an instrument which is generally better tolerated by the bladder than one made of metal.

The puncture through the symphysis pubis was first proposed by Dr. J. M. Brander of Jersey, in 1825, and several successful cases have since occurred in the practice of himself and others. He has usually employed a hydrocele trocar of medium size for the operation, which is thus performed: the patient should recline, and the trocar is introduced—whether after a small preliminary division of the integuments or without it, appears to be immaterial—about the centre of the symphysis reckoning from above downwards, and in a direction at about right angles to the vertical axis of the body. Dr. Brander says, “somewhat obliquely downwards and backwards towards the sacrum, varying the direction according to circumstances; a piece of flexible catheter is then to be introduced through the canula,” and retained by a tape.

In considering these methods of affording relief to the distended bladder in reference to any case which requires an operation, the question to be first solved is the following:

Are the patient's powers and condition such as to compel us to prefer the simplest method of affording immediate relief, without regard to ulterior results? If so, unless the urethra can be felt in the perineum distended with urine, which may sometimes be the case, especially if that region be not thickened or deformed, the rectal puncture of the bladder, supposing the prostate not to interfere (putting aside the puncture by the symphysis, as not yet sufficiently tested by experience to be considered on equal terms with the older operations), is generally the simplest method, as it affords instantaneous relief at the smallest possible expense to the patient's powers. But if it is probable that the canula may be required for a long period of time following the operation, I then prefer the supra-pubic method, especially if the bladder is distended, as it is inconvenient and distressing to a patient to maintain a canula in the rectum for more than a few days; whereas I have seen patients wearing with perfect comfort a tube for many years above the symphysis pubis. Again—but this is rare—if distension of the urethra is perceived in the perineum, a lancet or sharp-pointed bistoury may be carried into it, and a female catheter introduced by its side before it is withdrawn; or if the powers of the patient are good, and the condition of the parts is natural, perineal section may be employed. Having relieved the bladder, we can make a careful attempt to divide the stricture, by introducing a

fine probe from below upwards through the stricture, and passing a catheter into the bladder. If, however, induration and deformity of the perineum exist, as above indicated, the crisis of retention is not generally a favourable time for adopting this proceeding.

The treatment of retention of urine from hypertrophy of the prostate. When retention suddenly occurs in these cases, it is due to local congestion or inflammation. Hypertrophy occurs only after middle life, and develops itself slowly; and when much obstruction exists, very slight exposure to cold, or an excess in wine or in sexual excitement, may produce total retention. When this happens, catheterism is usually absolutely necessary; for although partial relief may be afforded by the measures, already described, which avail to reduce congestion, inflammation, spasm, and pain, the bladder can rarely be emptied by any other than artificial means. If, then, the use of the hot bath and of opium has been attended with little success, we are at once to use the catheter. In these cases a well-curved gum catheter, of good size, say 9 or 10, and with or without a stilet, will often pass more easily than any other; but it should have been kept on an over-curved stilet for a considerable period of time, in order to impart to it that permanency of curvature which is generally essential to success in its employment. It is scarcely possible to overrate the value of instruments thus treated. But in the absence of such a one, and also in some cases where the prostate is unusually large, it is necessary to employ a silver prostatic catheter. This should not be less in size than No. 9 or 10; it should be from 12 to 14 inches long from the rings on the handle to the end of its beak or point; and the curved portion should comprise about a fourth to a third of a circle, which measures from $4\frac{1}{2}$ to $5\frac{1}{2}$ inches in diameter; the mean of these being, perhaps, the most generally useful size.

In passing the ordinary prostatic catheter, any difficulty met with is usually confined to that part of its course where it arrives at the neck of the bladder. In most instances its point requires to be tilted up over the tumid prostate. On this account a beaked catheter, that is, one resembling in form a lithotrite, will sometimes pass readily when the former fails. Occasionally a stout wire stilet in the gum catheter becomes of essential service by permitting us to alter materially the form of the instrument as required. Further, it enables us to put in practice a manœuvre of considerable utility, well known as having been originated by the late William Hey, of Leeds, which may be thus described: the catheter, mounted on its stilet, having been introduced as far as to the obstacle, the stilet is then withdrawn about an inch, which has the effect of increasing the curve and elevating the point of the catheter, so as often to carry it over the enlarged portion in a manner less easily accomplished in any other way.

The question occasionally arises, Is it desirable at once to evacuate the entire contents of the bladder when retention has existed for a considerable period of time? In very rare instances the removal of a large quantity of urine, amounting to several pints, especially when an upright position of the patient has been incautiously permitted, has been followed by fainting and depression, from which he has never rallied. When the extent of vesical dulness is very considerable, it is therefore prudent to afford relief in a gradual manner; and, supposing that the catheter is retained, this may easily be accomplished. The removal of some thirty or forty ounces will probably afford complete ease, and after the lapse of half an hour or an hour another portion may be withdrawn; in this manner the bladder may be gradually brought to adapt itself to the normal condition of contraction, which subsequently, as a rule, must be insured at least once or twice a day. It is not long since my evidence was required in a court of law, in a case in which death had occurred instantly after six pints of urine had been suddenly withdrawn in the upright position.

A point of importance remains. A catheter having been introduced with difficulty for the relief of retention, should it be permitted to remain? The answer must depend on circumstances. In support of the negative, if the parts are already in a state of considerable irritation, it is undesirable to permit any chances of adding to it, of which the presence of a catheter may be one. On the other hand, the bladder, after long retention, will very soon fill again, and less

hazard may be incurred by the presence of the instrument than by a repetition of the efforts to place it there, especially if great difficulty was experienced in passing it in the first instance. Greater weight usually attaches to the latter consideration, as a rule, than to the former. I have often seen great danger incurred by the too early removal of a catheter which had relieved an urgent attack of retention.

If, however, which very rarely happens, catheterism proves unsuccessful, and relief is necessary, the bladder may be punctured or the prostate perforated. For the methods of performing the former operation, see page 419. If the prostate be very large, the rectum is not so convenient a situation for the proceeding as the supra-pubic region, which is therefore generally adopted. I have punctured by rectum with the best results for retention from enlarged prostate, but then a fluctuating point was within reach of the finger, in which case it would be safe; this condition, however, is to be regarded as exceptional.

Perforation of the obstructing portion of the prostate may be performed with a strong silver catheter, about No. 9 or 10 in size, and rather longer than the ordinary catheter, but not possessing the large curve of the full prostatic instrument. The operator introduces this to the seat of obstruction, and satisfies himself by means of a finger in the rectum that it lies fairly in the urethra, and is engaged in the prostate; he then steadily carries it onward towards the cavity of the bladder, by pressing the point firmly forwards, and at the same time slowly depressing the handle; and he desists on feeling that the point is free in a cavity, and on finding that the urine flows through the instrument. This was done by Home and Brodie. Liston employed a cutting stilet "carried through a slightly-curved and long canula," and "practised the operation a few times successfully." Whatever be the instrument employed, the Surgeon is careful to maintain it in the middle line, and also to aim at making the point emerge just behind the neck of the bladder, neither too near the pubes on the one extreme, nor the posterior wall of the bladder on the other. The catheter or canula, as the case may be, should be retained not less than forty-eight hours afterwards in the bladder, that the tissues around may consolidate, and no difficulty be experienced in replacing it by a catheter when withdrawn.

Extravasation of urine from rupture of the urethra may take place during unrelieved retention of urine by the giving way of the urethra at some point; it is very rare indeed that the bladder itself is ruptured. In either case, however, mechanical distension is not the direct nor the only cause. Ulceration of the mucous membrane behind the stricture, increased by the influence of urine in almost constant contact with it, causes a breach of the urethral walls. The bladder contracting drives the urine with great force into the cellular interspaces of the superficial fascia of the scrotum and abdomen, when the rupture occurs anterior to the membranous portion, as is almost invariably the case. The situation of the swelling and inflammation is characteristic in these cases, because the course of the extravasated urine is defined and limited by the union of the superficial with the deep layers of fascia at certain points. Thus the scrotum is first gently distended; a bag, as it were, being formed by the union of the superficial and deep fasciæ across the perineum, and by their connexion with the pubic rami. As the fluid increases, it rises into the coverings of the penis and over the pubes and abdomen, but does not descend to the thighs, because in the line of

Poupart's ligament these fasciæ are similarly blended, and prevent the passage of urine beyond their junction. The consequences of this extravasation are extremely disastrous; an unhealthy inflammation results from the irritating fluid wherever it goes, and the areolar connexions of the skin and subjacent tissues are destroyed. If unrelieved, the distension becomes enormous, the scrotum sometimes attaining the size of a human head; the skin assumes a dusky red hue, or becomes purplish and livid; and gangrenous spots are sometimes apparent; not unfrequently such a one is seen on the dorsum of the penis, and is generally regarded as a very unfavourable sign, although by no means one that is necessarily fatal. The general condition of the system is one of great depression; and unless complete relief be afforded, the patient must inevitably soon succumb. He is frequently delirious, with brown tongue and extremely feeble pulse, when the extravasation is considerable.

In these circumstances it is necessary at once to make free and depending incisions into the distended parts. The scrotum especially demands a deep incision on either side the middle line, frequently the pubes, and the penis itself also. These incisions will not only free the parts from the extravasated urine, but provide for its passage from the bladder. By these openings the purulent matters, débris, and sloughs will subsequently come away, often in very large quantity. No immediate measures for the cure of the stricture are necessary, as in the present state of the patient they are neither practicable nor advisable; although it is probable that when the retention is relieved a catheter may be passed into the bladder by the urethra; however, there is no occasion to do this until the system has rallied, which it often does to a marvellous extent. In a few hours the sufferer may emerge from a state of utter prostration to one of comparative comfort and promise; the symptoms of depression and exhaustion sometimes disappearing as by a charm, unless the injury inflicted has been too extensive to admit of repair. Meantime, abundance of alcoholic stimulant and nutriment must be given to support the powers of life. Chlorate of potash, ammonia, and bark are often serviceable. Opiates are rarely necessary unless symptoms of nervous excitement appear.

However favourably the patient progresses, a considerable amount of sloughing takes place. This is commonly the case with the scrotum to a greater or less extent: both testicles are sometimes completely stripped of their covering, and are seen bare in the wound, and even hanging by the cord. During this process the removal of the products of decomposition and the cleanliness of the parts must be provided for. Antiseptic applications frequently changed, as yeast or beer-ground poultices, linseed-meal or charcoal poultices, with a few drops of the chlorides of lime or soda well stirred in, promote these indications. The use of the disinfecting chlorides, of carbolic acid, or of powdered charcoal, and free ventilation of the room, should be adopted.

If the extravasation have taken place between the two layers of the deep perineal fascia, a firm, hard, and deep-seated swelling may sometimes, but not always, be detected in the perineum. This is to be at once freely opened. If it occur behind the fascia altogether—but this is very rare—the urine finds its way upwards around the base of the bladder, and a fatal result is inevitable.

Rupture of the bladder. This accident is excessively rare except as the result of direct violence. It then usually occurs from a blow on the abdomen or from a fall, when the viscus is distended with

X that is an error in piecing the
copy - it means not after capture from
discuss - but after accident there are
a few records on record

urine. It may be occasioned by a fragment of bone when the pelvis is fractured (see vol. ii. p. 480). When it happens as a sequenee to stricture, it does so by a process of the same nature as that already described as affecting the urethra, although it may not always occur in the bladder, properly speaking, but in a thin and dilated saeculus springing from it. Occasionally the discharge of its contents takes place directly into the peritoneal cavity, more commonly into the cellular connexions of the organ below the line of its peritoneal coat, after which it may secondarily escape through the peritoneum or not. In any case a recovery has never been known to happen, and can scarcely be regarded as possible. X

The symptoms of vesical rupture take place after a prolonged but not necessarily absolute retention, for some surplus of urine may have been previously escaping by the urethra. The patient usually states that he has felt something give way. Acute abdominal pain then sets in; the belly becomes exceedingly tender and distended; the features are pinched and anxious; the breathing hurried; obstinate hiccough occurs, sometimes vomiting; the pulse is sharp, quick, and irregular; the flow of urine ceases altogether, as also does the straining to void it. General fluctuation may be sometimes found in the abdomen, and inordinate distension of the bladder, before felt in the rectum beyond the prostate, has now disappeared. Sometimes the patient is delirious, and even maniacal. And after a period varying from thirty-six hours to four or five days from the time of the accident, during which the patient's agonies are extreme, death takes place.

The indications of treatment which, in the absence of experience, we should endeavour to fulfil, would be as follows: To provide for the free exit of the urine from the bladder by puncture; to alleviate suffering by large doses of opium, with hot fomentations and rubefacients to the abdomen; and to support the powers of life. Whether an attempt to remove the urine in case of extravasation into the abdominal cavity, by puncture of its walls, should ever be entertained, is an unsolved question. Such a proceeding affords the only chance (exceedingly slender as it is) of recovery which surgical aid could afford.

HENRY THOMPSON.



URINARY CALCULI AND LITHOTOMY.

OF all the ailments to which the human frame is liable, that of the formation of a stone or calculus in the kidney, bladder, or urinary passages is undoubtedly one of the most formidable and important. And on account of the tendency of this formation to become lodged in certain dilated portions of the urinary apparatus behind natural necessary narrowings, it is thereby rendered liable to increase in size, and consequently soon to become impassable and incapable of expulsion. The stone now acts as a foreign body, and irritates the delicate structure of the part in which it is retained, causing at first local disturbance and mischief, afterwards seriously involving the constitution, and ultimately leading to a miserable existence, which most frequently terminates in a lingering death.

In order to comprehend more fully the subject in all its bearings, it behoves us to take into consideration the causes and formation of stone; and in doing so we must necessarily review cursorily the circumstances which may give rise to this affection, by passing in survey the more simple and slight deviations of the urinary fluid, then its more aggravated changes from the condition of health, until we arrive at those still more complex and dangerous forms, which cause the amalgamation of the deposits into a mass, constituting a stone.

But previous to these inquiries, it is the essential duty of the Surgeon to be well acquainted with the urine in a state of health, and in its varied conditions under every circumstance. He should know its chemical constitution, its specific gravity, its amount of acidity, its variety of colour, its microscopical appearances, &c.; and not only this, but he must also bear in mind the changes which the urine undergoes during certain conditions of the body, and during certain periods of the day: thus there is the urine of the blood, passed early in the morning before any repast; the urine after the use of drinks; and the urine after the partaking of solids,—all modifying the condition of the constituents. All these points are carefully detailed in our standard chemical and physiological works, and in the numerous special monographs on the urine, to which the reader is referred.

In making a careful analysis of the constituents of the urine, we find that there are two sources from which an abnormal condition

